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VIEWS, NEWS AND INTERVIEWS.

The Schuyler Electric Company, of Middletown, Conn., exhibited from the top of its building last week what is said to be the largest electric search-light in the world. The lens and the mirror back of the light are each five feet in diameter, and the light is of 375,000 candle-power. It will be shipped to Chicago in a few days to be placed on exhibition at the World's Fair. It is to be presumed that the photometric tests were made on the basis of one square inch having a certain candle power, and this quantity being multiplied into the total cross sectional area of the beam of light.

Two of the 10 great turbine wheels, of 5,000 horse-power each, which will constitute part of the immense power plant at Niagara Falls, are now nearing completion at the L. P. Morris works, at Philadelphia.

The latest development in General Electric is that the headquarters of the street railway construction department are to be moved from Boston to the Edison Building, 44 Broad street, New York.

The details of a singular accident to an overhead electric light conductor come from Cuba. The bridge crossing the San Juan river in Matanzas had been carried away by a flood, and a long span had to be made with the wires crossing the river. One of these wires broke in two, and both ends fell into the water. At the station and in the part of the city lighted by that circuit no one noticed any change in the lighting, so it was left until morning, when the wires were taken out of the water and spliced, the current having passed through the water all night.

Three big dynamite guns, intended for the defense of New York harbor, have been nearly completed at the West Point foundry, at Cold Spring. Two of the guns are already completed, and are now being fitted with an electric motor gear for training, elevating and depressing the guns. This is believed to be more effective than the hydraulic motor gear. Two of the guns are 15-inch fellows, and the quantity of dynamite their shells can throw will be such as will be likely to destroy the biggest ironclad it hits. A battery of three of these monster dynamite guns for the San Francisco harbor will be ready in two months.

Mr. Gustave Hartridge, F. R. C. S., surgeon to the Royal Westminster Ophthalmic Hospital, London, who has made a careful analysis of the various kinds of light, says emphatically that "the incandescent electric light, judiciously placed and shaded, has advantages not possessed by any other artificial illumination. Not only is it the best light for strong and healthy eyes, but even those eyes that are unduly sensitive or the victims of disease, may work longer and with less risk and discomfort than with gas, oil or candles."

Electric Rail Welding.

The operation of welding by electricity the rails of the West End Company in Cambridge, Mass., is attracting a great deal of attention, and interested crowds are constantly on the spot, pushing for vantage ground from which to see the machine at work, and speculating as to how it is done. Many and strange are the theories and explanations advanced by the "knowing ones," the usual quota of whom are always present, and the fragments from this source which occasionally reach the ears of the men employed, contribute greatly to their amusement.

The machine has now been in operation for about a week, and a considerable stretch of track has already been covered, though better progress will be made from now on, as the men are becoming more familiar with the work as it progresses, and are handling it more rapidly in consequence. The system is one devised by the Johnson Company, of Johnstown, Pa., and while they have already done some amount of similar work on their own lines in Pennsylvania, the present contract is the first that has been attempted for outside parties, and the machine now in use is the first one constructed.

JOHNSON ELECTRIC RAIL WELDING APPARATUS AT WORK ON THE TRACKS OF THE WEST END STREET RAILWAY COMPANY, CAMBRIDGE, MASS.

The apparatus consists of a box car open at one end to admit of the free operation of the crane which supports the welder, and by means of which it is moved from side to side and placed in position. The opposite end of the car is occupied by a 250 horse-power motor-dynamo, manufactured by the Thomson Electric Welding Company, of Boston, by means of which the 500 volt direct current taken from the overhead wires is transformed into an alternating current of about 500 amperes, and passed into the transformer located in the base of the welder, from which it is applied to the rails at 50,000 amperes. The car is also supplied with two 25 horse-power Thomson-Houston railway motors for operating it on the tracks, and contains water tanks with a capacity of 500 gallons. This water is kept in constant circulation by means of a small pump, and passes through rubber pipes to the copper contact pieces of the welder, keeping them always cool. The welder itself is a massive affair weighing four tons, and is suspended from the crane immediately over the joint to which it is to be applied. It is fitted with two immense jaws which grip the rail on either side after the steel spanners have been put in position. These jaws are operated by a toggle joint worked by a right and left hand screw. By this means one man is able to apply a pressure of 40,000 pounds.

When the joint is held in this vise-like grip the current is turned on, and in a few seconds the rails at the point of contact begin to glow and are soon at a white heat. By this time the joint is closed up and the steel pieces on either side, under the immense pressure, have become a part of the rail itself. The current is then turned off, the grip loosened, and the car moved forward to the next joint.

The crane supporting the welder was built by the Yale & Towne Manufacturing Company, of Stamford, Conn., and is operated by a small one horse-power Crocker-Wheeler motor perched on top of it directly under the projecting roof of the car. The contrast between the size of the motor and the bulk it operates is very striking. The total outfit as at present constructed weighs 30 tons, but another car is now being built which will be lighter and easier to handle, and by which the work can be done more rapidly. The Johnson Company have a contract to weld 16 miles of track for the West End as a practical test of the system, and if the results are satisfactory the work will be continued over the entire line.

W. M. Brown, of the Johnson Company, who is in charge of the work, estimates that it will take them three months to carry out the present contract.

A TRIP TO THE WORLD'S FAIR.

THE KIND OF PEOPLE WE MEET—A CHAT WITH PROFESSOR BARRETT—THE BURTON ELECTRIC WELDING PROCESS—MR. E. H. LYONS TELLS OF THE TELEPHONE AT THE FAIR.

"Oh! Oh! Fred," shouts a shrill, weak voice.

A wail or a grunt, whatever you choose to call it, is the only answer.

Another call, and as the startling information is wafted down the stairs of my modest lodging house, that "yesterday father killed four shoats," Fred is heard to roll over once or twice in his bed and then go to sleep again.

The information is again offered by mother, that "father writes that the Tuckers came over to the house last evening and father tapped the cider barrel." It must be remembered that this is startling news for the person for whom it was intended; for any incident in Squedunk, no matter of what import, is magnified manyfold. Then as I turn over in bed, for it is only six o'clock, I try to imagine what these guileless country folks must think of the many scenes of grandeur which they daily see at the White City.

It seems as if they take almost everything as a matter of course. The structures are too vast for them to give vent to any more exclamations of wonderment and surprise. They have rubbed their magic lamps and have been transported into a realm of wonders exceeding anything they ever dreamed of before in their meek existence.

Thirty or forty young ladies from the University of Vermont occupy the house next to the one in which I room, and headed by a tall, gaunt professor of the male sex, manage to make night hideous with what they term singing. They seem to have far away voices which sound as if they were produced by the scraping of two pieces of rusty iron, and I wonder if this is a climatic effect, the result of the bracing hoosier atmosphere of the Green Mountain State. Not having been there I cannot say. Every morning after partaking of their frugal 35 cent meal, in charge of the professor, they march off to the Fair grounds looking very much like a party of Mormon proselytes. They go very early, as one of them told me, to get the most for their money, and everyone breaths a sigh of relief when they are gone. All is hushed and quiet as the tomb—in comparison to what it was before.

A smart young man in a pea green suit remarked to me the other day that he thought the Fair grounds was like a bakery.

"Why?" I asked, in my conscious innocence of any reason therefor.

"Because," he muttered, as he got out of the way, "it is so full of crackers."

May be he was not far from wrong.

However, this is the style of the majority of the people now in attendance at the Fair. Presumably the residents of the larger cities will come with the expected cool wave. Let us hope that our expectations will be realized, for the Fair deserves to be a success in a pecuniary way.

The weather is intensely hot, and the humidity makes the heat almost unbearable. As soon as I reach the buildings I am obliged to take shelter under their magnificent arches, for the atmosphere inside of their doors is most agreeable—it is inviting.

I turn my steps in the direction of the Electricity Building. I see a face I recognize; its owner is the bridegroom I mentioned before. The bride is resting after the fatigues of the journey with some friends, and he is visiting the Fair for that day only alone. A couple of lines from Scott are suggested:

"Lightly from fair to Fair he flew,
And loved to plead, lament and sue."

The interesting exhibits on all sides attract my attention for quite a while, and at every moment I recognize many of the steps in electricity which have been so faithfully chronicled in the electrical press. Now something new strikes my eye, but there are very few things shown whose principles are not known to our attentive readers. It is the careful, attractive and thorough manner in which they are put together that appeals to my sense of appreciation, and I stop to examine and admire.

In an exhibition of this kind those who do not make a showing far above the ordinary will be passed by without an evidence of the slightest interest, by the most uninformed or even the most appreciative.

Things which one would go miles to see, if he were in this city at any other time, would be lost in the multitude of other more interesting exhibits. It is hard to tell what is best; so I deliver a compromise verdict and say that nothing is worse than anything else, it is all in variable degrees of excellence.

Towards the south side of the Electricity Building, in the gallery, are the executive offices. Here Chief Barrett, with his assistants, have their sanctums, and over each door in imaginary characters one may trace the word "welcome."

Mr. Barrett greets me in his usual cordial way, and introduces me to his assistant, Dr. Hornsby. Together we sit and chat awhile about the only possible topic, the Fair. Mr. Barrett deserves a great deal of credit for the admirable and artistic manner in which the many exhibits are distributed. It is no easy matter to take upon oneself the responsibility of the success of a matter of this kind. While the individual exhibitors are responsible for the quality of their exhibits, and all energies are bent in that direction, still, the harmonious grouping and the satisfying of every one concerned is indeed a difficult matter, and any one who has ever been in a similar position can appreciate the difficulties which are continually arising.

He complains that the most interesting part of the electrical display is outside of the Electricity Building. Machinery Hall is well supplied in the electrical line. The enormous Westinghouse generators and the numerous motors make quite a display in themselves. Then again many of the smaller companies have their dynamos running in conjunction with some special make of engine, and this combination exhibit has been monopolized by those who had charge of the arrangement of Machinery Hall.

After all, it is the live exhibits which attract the most notice, says Chief Barrett, and he cites an instance. In the place allotted to the Western Electric Company may be seen a remarkably ingenious screw manufacturing machine. Crowds are in front of this all day, waiting eagerly to see another screw drop from the almost human jaws of the chuck which the fortunate individual immediately in front of the hopper avariciously appropriates, to keep as a souvenir. These are not, strictly speaking, electrical exhibits, neither are the wire machines immediately adjacent; but as they furnish the means wherewithal, no one ought to complain. They are instructive, interesting, and being in active operation, are appreciated.

It is not an agreeable thing to find fault, but a suggestion for the remedying of a mild evil which has been recognized by many would, I think, not be out of place. Many, in fact the majority of the exhibits, are without attendants, and while signs to a great extent enlighten the uninitiated, he who seeks information is ofttimes sadly disappointed. Sometimes a card is placed upon a foreign exhibit, stating that information may be had from the consul or other foreign representatative in charge. This is obviously inconvenient, as one cannot spare the time to go in search of explanations; the explanations, as it were, should come to him.

The more prominent companies, and others that can afford it, have demonstrators who, provided with an enormous amount of patience, repeat time and time again to the ever-changing inquisitive multitude their explanation, which by this time they must know by heart. It is very tiresome work, and even when the inventor himself is the exponent, he becomes fatigued from the excess of astonishment and admiration bestowed by each newcomer. An example of this might prove interesting.

Burton's electrical welding is one of the features of the exhibition, not only because of its novelty, for the inventor has kept it well in the background while he has been perfecting it, but because of its simplicity and the wonderful effects produced. The inventor, Mr. Burton, has taken charge of the exhibit and is a most patient and untiring instructor. How hard it is to teach the grangers; one would think that they were a grand collection of know-it-alls. The following is a sample of a conversation which recently took the form of a comedy: A Chicago suburbanite with his family pushed their way to the front of the crowd who were watching Mr. Burton welding two large steel nails by simple immersion into a bucket containing a solution of soda and a large lead plate attached to one terminal of a transformer, while the wire from the other terminal was attached to the handle of the tongs which held the nails. The process is so astonishingly rapid, and there is no apparent cause why the nails should become heated so quickly, that no end of exclamations of wonderment are bestowed upon it. In this case our Hoosier friend had called up his little brood, and had forthwith commenced to descant upon the reason why. I listened, for it was really amusing to see how this ignorant countryman was implicitly believed by his wife and progeny; and I began to think how similar it is with some people's religion and how they are guided entirely by their faith in those whom they blindly believe to know more than they.

"Now you see, George," said he, addressing his son and heir, forestalling him in the expected question of what is that? "that man takes holt of them nails in them tongs, and that's the fluid in the bucket."

"I beg your pardon," interrupted a bystander, "the man said that there was soda water in the bucket."

George looked sceptical, but father continued, "Well when the electric fluid comes down the wires in them tongs, as the two fluids meet it makes the nails hot, just like when you put the water on the quicklime when you helped me make the mortar for the house."

George swallowed the story, fluid and all, and father added another nail in the structure which gradually raised him, in the eyes of his family, above the heads of every other man.

This is a sample conversation which ought to teach a lesson and adorn a tale. Even where the exponents are present, the grangers would put forth their senseless explanations. It is as Barnum's guide and interpreter so often explained, "the custom of the country," and we who live continually in large cities are as ignorant of the primitive customs of the countrymen as they are of our more advanced habits.

Not far from the electric forging exhibit, to the south of the building, is the tasteful structure built by the Bell Telephone Company. Herein are contained in glass show cases priceless relics which illustrate the wonderful improvements which have been made in the apparatus for the transmission of the human voice and other sounds. To the west of the building is a complete switchboard in operation, and twice a day does Mr. E. H. Lyons give talks on the telephone. Probably no other man has had so much experience with carbon transmitters as has Mr. Lyons. His experiments have extended over many years, and have been of the greatest value towards the perfection of the articulation of the telephone. He tells me that he has made a transmitter composed of an oxide of lead which has given great satisfaction, and it has produced sounds which were entirely free from any harshness. Unfortunately its life is extremely short, so that the company has adopted the granular carbon transmitter now in general use. This carbon resembles fine gunpowder, and is extremely hard and permanent. This has been one of the minor improvements in telephony during the past few years, but, to quote Mr. Lyons, "If one attempt to record the important radical improvements in the science during the last half a decade, the whole story would hardly cover a page of this journal. The greatest improvement, however, has been the adoption of cables composed of the thin copper conductors wrapped in ordinary tissue paper and surrounded by a large lead pipe." Unfortunately, if the least hole is made in the lead pipe, ever-present moisture creeps in by capillary action with marvelous rapidity, thus spoiling a section of the cable, which must, of course, be renewed by other perfect cable, thus entailing a loss of quite a large proportion, if breaks do occur. From an economic standpoint this is a decided improvement; for tissue paper is a great deal cheaper than the expensive india rubber insulating compounds.

A very interesting part of this exhibit, which, strictly speaking, has no right to be in the telephone building other than it is the invention of Professor Bell, is the wonderful photophone. Here sound waves are transmitted by a beam of light. The receiver in the original consisted of a plate of selenium, but several energetic inventors have taken upon themselves the improvement of the instrument, and have produced an apparatus which actually does speak, though with a thick muffled sound, not unlike that produced by a victim to a severe cold in the head. Selenium has been abandoned, and in its place has been substituted particles of cork which have been coated with fine lamp black.

Another feature of this exhibit is the loud-speaking telephone. This receiver, which has a very powerful horse-shoe magnet, and a diaphragm of iron of a thickness about equal to that of stove-pipe iron, is hung in the center of the room immediately over a little enclosure in which those listening are supposed to stand. It is not necessary to restrict one's position in order to hear the sounds which issue from the receiver, for the volume of the sound is such that one day Mr. Lyons, while returning from lunch at the Wellington Catering Company's rooms at the other end of the building, distinctly heard the clear and resonant tones of a cornet which was being played in New York at the time. When it is remembered that the length of Electricity Building is 690 feet, the enormous volume of this sound can be appreciated; and when one begins to realize that the originator of the sounds is nearly a thousand miles away, a faint idea of the value of the long distance telephone lines may be had. But, said Mr. Lyons, people will sooner go down to the Midway Plaisance and see a lot of dancing hoodoos than listen to the wonders of the telephone.

"What do you gain by this exhibit?" I asked.

"Very little," he answered, "other than teaching the ignorant public the value of the telephone, and giving them information concerning its proper manipulation. Why," he continued, "the crowd don't appreciate what we give them when we permit any one who desires to converse with an operator whom we have especially for that purpose in our New York office. A great many of the people believe that we are deceiving them, and that the person with whom they are conversing is somewhere in this city."

"What do you think of the Strowger automatic system?" I asked.

"It is difficult to say whether the system is practical which requires almost as much money in the way of high-priced salaries to run it as does our switchboard system with small salaries. It seems to me," continued Mr. Lyons, "that the most efficient system will be one that is built on the keyboard plan, like a typewriter. This, it would appear, would enable operators to obtain the greatest number of connections with the least expenditure of energy. The system could be manipulated much more rapidly than the one now in use, and would prove much more economical for both the consumer and the telephone companies."

JULIAN A. MOSES.

American Chemical Society.

THE FIFTH GENERAL MEETING TO BE HELD AT CHICAGO, AUGUST 21, 1893.

The following resolution was adopted by the Council of the American Chemical Society, June 7, 1893:

Resolved, That the general meeting of the American Chemical Society for the summer of 1893 be held in Chicago, at such date as may be determined by the committee appointed by the Society to co-operate with the World's Fair Auxiliary of the Columbian Exposition in arranging for an International Congress of Chemists.

In accordance with the terms of this resolution the committee to co-operate with the World's Fair Auxiliary have determined that the fifth general meeting of the Society shall be held during a period beginning August 21, 1893, in conjunction with the World's Congress of Chemists, to be held under the auspices of the World's Fair Auxiliary and the American Chemical Society.

The committee desire to call to the attention of the members of the Society and of American chemists generally, the fact that in view of the large number of eminent chemists, home and foreign, who have already signified an intention to attend the World's Congress of Chemists, and the valuable character of the papers that will be presented, this meeting will doubtless be the most important gathering ever held by chemists in the United States. The time and place are therefore particularly auspicious, and the promise of a most successful and enjoyable occasion very great. The meetings will be open to all chemists in good standing, and in order that a programme of proceedings may be arranged in advance, it is earnestly requested that those who desire to offer papers will forward titles thereof as early as August 1, to Prof. Wm. McMurtrie, 106 Wall street, New York city, care of New York Tartar Company.

It is also the hope of the committee that in view of the important part taken by the American Chemical Society in calling the World's Congress of Chemists, the Society will be represented by a large number of its members in this meeting. This is due to the foreign chemists who have accepted the invitations extended by the Society.

In matters of transportation to, and quarters in, Chicago, members of the Society will have all the advantages provided for those who will attend the World's Congress of Chemists. Those desiring information with this regard may obtain it by addressing Prof. John H. Long, No. 2421 Dearborn avenue, Chicago, Ill.

It is requested that as soon as possible after their arrival in Chicago, members will report at the Congress headquarters in the Art Institute Building, Lake Front and Adams street, and register their names and Chicago addresses, so that they may receive without delay such notices and information as the committees may have to distribute at that time.

WM. MCMURTRIE,
C. F. CHANDLER,
A. B. PRESCOTT,
C. E. MUNROE,
H. W. WILEY,
Committee to co-operate with the World's Fair Auxiliary.

Dust Destruction and Electric Lighting.

AN INTERVIEW WITH MR. EDWARD MANVILLE, OF LONDON.

[*From Lightning.*]

"The report recently drawn up by Mr. Manville on the electric lighting of St. Leonard's, Shoreditch, and adopted unanimously by the vestry, marks so important a development in the progress of electric lighting that I lost no time in seeking out its author" (writes our tame interviewer) "and getting from him all the information I could concerning his scheme. For the benefit of those who have not yet seen or heard of this report, I may begin by stating briefly that it combines under one scheme, in the most economical way possible, the three undertakings of refuse destruction, electric lighting and heating water for public baths and washhouses. The principal feature of interest is, however, the double saving involved in the combination of refuse destruction and electric lighting, the former now costing the parish separately £3,000 per annum, the whole of which would be saved, in addition to the cost of coal, by using the ash-bin refuse as fuel for the generation of electricity.

"You do not claim any novelty for the idea, do you?" I asked, after a brief discussion of the points mentioned above.

"No, I believe that all credit on this head is due to Professor Forbes, who several years ago strongly recommended the vestry of Paddington to put up an electric lighting station in combination with a dust-destructor."

"And do you really believe that the saving effected by the combination will be considerable?"

"I do, indeed. In fact I should fancy that the development will mark an era in the history of municipal electric lighting stations. It is only necessary to refer to the report of the St. Pancras vestry electric lighting committee for the past year to see what a great difference would have been made in the profits for the year on their undertaking, had they a dust-destructor—or, as I prefer to call it, a dust-utilizer—in combination with their central station. They spent, according to the published report, no less than £2,306 during the year on coal; and not only would this have been saved, but also some £500 out of their wages' bill by the absence of stokers' wages, which would then have been provided for in the cost of burning the dust."

"How would this affect the total cost of production?"

"At a very low estimate, I should say the cost of production of current in London would be reduced by, at least, 1¼*d.* per unit; and I have no hesitation in affirming that a municipal electric lighting station, supplying only 300,000 Board of Trade units per annum, would be able to supply current, if it were produced by the combustion of ash-bin refuse, for 4*d.* per unit for lighting purposes, and thus be able to realize Mr. Preece's oft-repeated assertion, that electric light is essentially the light of the poor man. Then, if current can be supplied for lighting purposes at 4*d.* per unit, it might well be supplied for motive power purposes during the day at from 2*d.* to 2½*d.* per unit; and this price would, to my mind, enable that desideratum of all electrical engineers to be accomplished, viz., the doubling of the load factor by the demands that would then exist for current for power purposes."

"Would the refuse of an ordinary parish be sufficient, as a rule, to provide all the light and power likely to be required?"

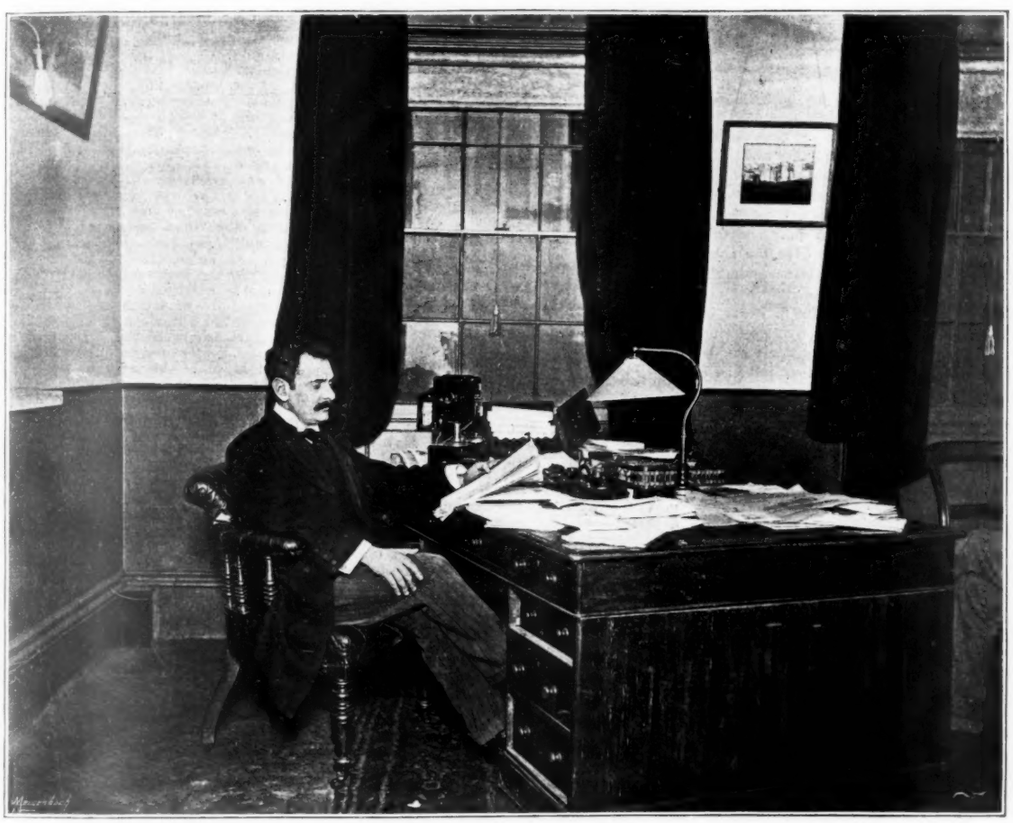
"Quite! I don't think the amount of power which might be realized by the burning of ash-bin refuse in various places is appreciated. In Shoreditch, where, I am glad to say, the vestry have decided to adopt my recommendation to utilize their dust-bin refuse for producing electrical energy, as much as 400 horse-power for 24 hours a day all the year round is available from this source; and at Portsmouth the amount would be upwards of 1,600 horse-power. Then the steaming of the boilers can be kept under control so enormously better when using hot gases outside a furnace than when the boilers are internally fired. In the latter case, the quantity of steam generated can only be controlled by varying the amount of fuel put on the fire. In the former case, the production of steam is regulated by the position of dampers, and nothing else, and we may hope to realize the economy in wages achieved in the States, where natural gas is used for firing boilers, and where one man is quite sufficient to manipulate the dampers of quite a large range of boilers, and to control the production of, perhaps, 2,000 horse-power without assistance."

"Are there many dust-destructors in existence in England that could be applied to this purpose?"

"There are plenty in existence, but it is a perfect marvel to see the unscientific manner in which they have been designed. With one exception they all embody just the very conditions they ought to avoid. Slow combustion, as a rule, prevails, and the burning refuse hardly ever exceeds a temperature of about 800 degrees Fahrenheit in the hottest part of the furnace, whilst the gases that are given off by the destructive distillation of the freshly thrown on refuse are carried straight away to the chimney shaft without being anything like thoroughly consumed, and naturally make the destructor a nuisance to the neighborhood. In other cases the temperature of the furnaces is raised considerably by forced draught, but the partially destroyed gases are carried up the chimney shaft. At Leeds, however, the subject is thoroughly understood. There the temperature of the furnace is brought up to upwards of 2,000 degrees Fahrenheit by means of forced draught, and the partially consumed gases from the freshly added refuse are brought through the hottest part of the furnaces and are thoroughly consumed before reaching the chimney shaft, a process which renders them utterly and completely innocuous. A dust-destructor of this type might well be put up in any neighborhood in which a factory burning Welsh steam coal could be worked without creating any more nuisance to the neighborhood than the factory would."

"How is it a scheme like yours has never been tried before?"

"Well, so far as I know, Shoreditch is the first instance of a local authority having the two schemes of a dust-destructor and an electric lighting station on hand at the same time. The boilers, of course, have to be specially designed for working with hot gases, and the destructor has to be more or less specially designed for working with boilers, so that, unless the two schemes are considered together, it is not easy to combine them. At Warrington the destructor is used for generating steam, though the destruction of the gases is by no means perfect; at Leeds the two purposes are admirably combined, but the steam is used for grinding clinker not for electric lighting, and is not required in any great quantity."



MR. EDWARD MANVILLE IN HIS OFFICE AT 29 GREAT GEORGE STREET, WESTMINSTER, LONDON.

"The Refuse Disposal Company, whose pamphlet I have here, make much of their system of sorting the dust-bin rubbish, so as to pick out from the good fuel all the broken crockery, tin pots, dilapidated coal-scuttles, etc., which may be considered as inferior in this respect."

"Do you recommend the same process?"

"No. The game doesn't seem to me to be worth the candle. Sifting has to be carried out by an expensive and elaborate process, and when it is done you have an excessively unpleasant mass of produce to deal with. There may be a very good market for rags and bones, but you cannot expect a vestry to undertake this form of traffic. Besides, I have made experiments with sifted and unsifted refuse, and there is little, if anything, to choose between them. 'Shoreditch ordinary' will do well enough to provide all the electricity the parish is ever likely to need."

"Do you mean that it is not a good parish from the point of view of electricity supply?"

"Oh, no; on the contrary, it is an excellent parish. Better than many West End districts. It is a perfect nest of small factories, into which electric power ought to be capable of being introduced with very little difficulty. At present gas engines are largely used; but it would pay a man in actual cash down to sell his gas engine and put down an electric motor. A four horse-power gas engine costs, say, £170, and could be easily sold for £70, whereas a motor of the same power would not cost more than £50, all told. Besides, at 2*d.* per unit, taking into consideration the ease of stopping and starting, a motor would be far cheaper to work than a gas engine."

"And are the prospects of lighting good?"

"Quite as good as the other. Shoreditch shops are brilliantly lighted, and, instead of closing elegantly at 5 o'clock, as they do in the West, they keep open till 10 or 11 o'clock at night, and 12 o'clock on Saturdays. Besides, there is no 'season' in Shoreditch. The inhabitants are more considerate than to shut up their houses for a number of months in the year and leave the supply company to starve. On every ground, when it comes to electric lighting, a parish like Shoreditch is to be preferred to one in the West End."

"You propose to put down a high-tension continuous current station, do you not, with 'dynamotor' sub-stations and storage batteries to take the night load?"

"Yes; for a district of this kind it is at present incomparably the best. You must supply continuous current where motive power is likely to be an important factor. There is no reason, however, why the high-tension primary current should not be alternating. An alternating motor coupled to a direct current dynamo in the sub-station would answer just as well as the 'dynamotor.' However, this part of the scheme is hardly settled yet."

"As regards cost, what do you make the actual saving to be on your scheme, as compared with a separate one?"

"Well, we save about £2,000 in the buildings, to begin with. The destructor, with 14 furnaces and chimneys, would cost £8,000; and the station, without boiler-house or chimneys, would cost £4,000, instead of £6,000 with. The annual saving on the destruction of dust would be, according to Mr. Mansfield Robinson's figures, the difference between 1*s.* 3*d.* per ton and 3*s.* per ton (the present cost). Taking 20,000 tons of refuse per annum, this means a saving of £1,750 clear. The saving in coal, by using refuse instead, I should put at £1,200. Then, in addition to this, about £500 per annum will be saved by having the bath and washhouses in close proximity, so that the water can be heated from the destructor also. Thus the total annual saving would be £1,750+£1,200+£500= £3 450."

TELEPHONE CHAT.

Madison, Ill., will have an automatic telephone system.

Indianapolis is making preparations to tax the telegraph and telephone poles.

The long distance telephone people at Findlay, Ohio, are pushing the line towards Lima as rapidly as possible.

The business men of Batesville, Ark., have proposed building a telephone line between Batesville and Buffalo City.

The Strowger Automatic Telephone Exchange, Chicago, has increased its board of directors from three to nine.

The Chestertown, N. Y., Telephone Company, to operate telephone lines between the towns and villages in Warren, Essex and Hamilton counties, was incorporated last week.

The Western Union people, it is said, are disturbed that the Pennsylvania and other railroad companies are substituting the telephone for the telegraph to so great an extent.

It is announced that Hon. Charles Foster has been offered the presidency of a telephone company in Ohio, at a salary of $6,000 a year. It is a company in which Hon. S. B. Elkins and other prominent men are interested, and of which Mr. Foster is a director. When he failed he sent in his resignation as director, which the company declined to accept. Now comes the statement that he is to be made president of the new company.

The output of the American Bell Telephone Company for the month ending July 20 was as follows:

	1893.	1892.	Inc.	Dec.
Gross output.	7,117	7,779	....	662
Returned.....	4,818	5,066	....	248
Net	2,299	2,713	....	414
Since Dec. 20:				
Gross.....	59,466	57,903	1,563	
Returned.....	32,752	28,676	4,076	
Net.....	26,714	29,227	....	2,510

HORRIBLE SCENE AT AUBURN PRISON.

Bungling Electrocution of a Condemned Murderer.

THE ARMATURE BURNED OUT AND CAUSED AN HOUR'S DELAY WHILE CURRENT WAS SECURED FROM AN ELECTRIC LIGHT STATION.

At Auburn, N. Y., on July 27, a horrible and convincing example of the uncertainty of electrocution was afforded. A colored man of the name of Taylor, convicted of murdering a fellow prisoner and condemned to electrocution, was strapped in a poorly constructed death chair at Auburn prison and tortured for over an hour.

The victim of the horrible tragedy was a muscular negro, nearly six feet tall, and of powerful frame. He had no fear of death, and without a word walked to the chair and placed himself in the seat of torture. Quickly the straps were adjusted, and within a minute, and while the priests were praying, the current was turned on. According to State Electrician E. F. Davis, 1,820 volts went through the body, but it was only for a second.

When the switch was thrown a powerful convulsion contorted the frame of the victim, a groan of agony came from his lips, his legs stiffened out breaking off the foot rest of the death chair, and his body slipped down in the chair. The man would have fallen forward on his face if two keepers had not grasped the chair and held it and its writhing burden from toppling over.

The body lay in a reclining position in the chair, the current apparently still on. The witnesses took it for granted that the current had done its work. The body was limp and motionless. Electrician Davis turned off the current. Suddenly a moan came from the lips, saliva was seen to issue from the mouth, and the man gave a gasp for breath.

"He is not dead," was the whispered exclamation of the spectators. Warden Stout ordered the current turned on again, and Electrician Davis tried to obey.

It was then that the horror of the situation dawned on all. The switch was thrown, but the electric fluid did not respond.

The dynamo had failed.

Again did Davis attempt to turn the current into the writhing body, without success. The victim was now breathing stertorously, saliva was flowing from his mouth, and he gave every evidence of reviving. The spectators were waiting with blanched faces for the poor man to cry out in his agony.

Then the straps were unfastened from the death chair, a cot was brought in, the victim was placed upon it and carried into an anteroom.

Davis, meanwhile, had run to the dynamo room and returned with the information that the armature had burned out, leaving the executioner without power to finish his horrible task.

Meanwhile, Taylor's labored breathing increased, his pulse grew stronger, and as he recovered strength he groaned aloud and moved from side to side, as if in agony.

Finally the muscular man attempted to rise from his cot. His eyes remained closed. Although unconscious, and precisely as in the condition of a man stricken by apoplexy, he showed such marked signs of resuscitation that his arms and legs were bound again.

The man's struggles even then were so violent that it became necessary to resort to a drug to quiet him. Morphine was injected into his leg by Dr. Conway, and after a while the powerful opiate operated to reduce the convulsive exertions. But in fifteen minutes the struggles were renewed, and a stream of saliva poured from his mouth. Chloroform was then given to him.

His color changed to a deeper black as his breathing became harder, and as he grew easier it would lighten up. After a while it seemed to the doctors who surrounded the cot that the man was returning to consciousness.

Dr. Conway was asked by the New York *Recorder* correspondent if the patient would recover if given time, and his emphatic reply was, "Most assuredly."

While the doctors were watching the law's victim, Warden Stout and Electrician Davis were arranging to finish the work. The burned out armature precluded the possibility of using the prison dynamo. Outside aid was necessary. Quickly word was sent to the Auburn electric light station that assistance was needed. The superintendent and a force of men went to work and connections were strung from the commercial incandescent light circuit, which passes in front of the prison, 300 feet from the death chamber. This was the work of half an hour. The broken chair was hastily repaired. It was an hour, however, before all the details had been arranged, the machine tested and everything was in readiness for another trial. The work of the morphine and chloroform was apparent. The limp and inanimate form was taken up from the cot and replaced in the chair. The straps were speedily adjusted around the almost lifeless body and at 1.55 o'clock, just an hour and nine minutes after the first shock, the second was given. It was of 1,240 volts, and in one minute the victim was dead.

The Brooklyn Trolleys.

The general introduction of electric railways in Brooklyn has not been attended with as many drawbacks as conservative minds apprehended. There have been comparatively few accidents, and the system, as a whole, is working fairly well. Blocks are infrequent, the gain in time is considerable and the trolley has already become a popular institution. Its superiority over the cable car as operated in Broadway is incontestable. The indications point to the disappearance of horse-cars from every line in Brooklyn and to the permanent adoption of electricity as a motor. This result certainly can be accomplished if the corporations, influenced by enlightened self-interest, are willing to make intelligent efforts to improve and perfect the system.

One thing which is absolutely necessary is the reduction of the liabilities to accident. It is probable that a better brake can be introduced than the one now in operation. But what is more important is an increase of intelligence in the working of the mechanism. The motorman in an emergency has three resources at his command. He can shut off the power, he can apply the hand-brake to the wheels, and he can reverse the direction of the car. A large majority of the accidents which have occurred might have been prevented if all these resources had been employed effectively. The motorman turns two cranks in an emergency, but ordinarily neglects the third precaution of reversing the motion of the car. In order to prevent the recurrence of accidents the corporations ought to have a superior class of operatives. Many of the motormen now employed are fit only for driving horses and for stable work. The efficient motorman ought to have the instinct of a mechanic. He should have the intelligence required for operating the mechanism under his hands without losing his head under unforeseen circumstances. Motormen of this class would naturally earn higher wages than are now paid, but they would be cheaper than the inefficient labor now employed on the front platform.

Another improvement to which the trolley companies will inevitably have recourse is the substitution of underground for overhead wires. The present system, while economical in construction, is costly in maintenance, unsightly in appearance and dangerous on many accounts. The overhead wires are constantly in need of repairs, although everything is new and the conditions of weather tend to promote safety. When winter comes and the network of wires is wind-swept, encased with ice and rendered brittle by alternate freezing and thawing, there will be serious danger to be apprehended from sudden breaks and stoppages. The trolley will remain in use in all the cities where it is now running, but the removal of the overhead wires can only be a question of a few years.—*New York Tribune.*

The Patent Office Charges Fall Through.

EX-COMMISSIONER SIMONDS, CHIEF CLERK BENNETT AND FOSTER & FREEMAN FULLY EXONERATED.

As announced in the ELECTRICAL REVIEW last week, the sensational charges against ex-Commissioner of Patents William E. Simonds, Chief Clerk Bennett and Foster & Freeman, patent attorneys, were not proved, and all the gentlemen concerned have been completely exonerated. Commissioner Seymour's decision is a very exhaustive and able review of the whole subject under investigation, and contains many points concerning the rights of inventors and the duty of the government to them which are of especial interest. The facts in the case have been quite fully and correctly given in former issues of the ELECTRICAL REVIEW. The following extracts give the substance of the decision·

The grave nature of the charges and the distinction and high character of the defendants demand the most careful consideration of the case, and the close scrutiny of the evidence.

It is necessary to recur to the general principles upon which the patent system rests, to discover the true limits of the secrecy practised respecting applications for claimed inventions on file in the office, and under what circumstances it may lawfully be relaxed.

The true inventor may, if he choose, withhold from all others all knowledge of his invention. The government holds out inducements to this class to make a full disclosure of their respective discoveries, in that it undertakes to secure to them for limited times the exclusive right to their manufacture and sale. The first prerequisite of the reward thus offered is the making and filing in this office of a full and candid description of the claimed improvement, not however, for publication in the first instance, but for criticism and investigation. If the application is found to have merit and the invention not to have been anticipated, the reward is conferred by the issue of the patent based thereon. If the contrary conclusion is reached by the office, the applicant takes nothing for the revelation contained in his specification. The question is whether the applicant in such latter case has parted with his exclusive dominion over his ideas, whether valuable or otherwise. May he neglect his application and be remitted to his former state?

It was claimed in argument that there is no law requiring a pending application for a patent to be kept secret, and that when abandoned any counsel desiring it in litigation has a right to do it. Whether one can write a paper describing his invention and by depositing it in the Patent Office as a part of a regular application, place it where he himself may not be compelled to produce it when he becomes a party in court, is one thing, and with that question I have no concern in the decision of this case. The cases cited—Telephone Cases, 126 U. S., 565; Edison Electric Light Company *vs.* U. S. Electric Lighting Company, 44 Fed. Rep., 294, 289, 299; same, 45 Fed. Rep., 55; National Typographic Company *vs.* New York Typograph Company, 46 Fed. Rep., 114—are all cases of that character. In them the parties could not maintain their standing in court and withhold the admissions expressly or by implication made in the applications which they were asked to produce. But the question in this case is of a different character. May the Patent Office itself, upon the request of a stranger to the proceedings and in the absence of an interference, contest in the office involving those papers, properly divulge the contents of applications, either pending, rejected or abandoned, without the consent of the respective applicants, in the absence of facts clearly showing an abandonment of the invention itself and not of the application merely, or special circumstances from which abandonment of the invention may be inferred? I am clearly of the opinion that it may not. The Patent Office is a repository of merchantable ideas, susceptible of piracy, and until the patent issues, securing to the applicant his exclusive privilege, the office has no right to trust the ideas confided to it as its own, or as belonging to the public, unless the applicant himself so treats them, or by implication or otherwise consents that they may be so treated.

Whatever may be said of the practice of having copies made in advance of the decision of the question whether they ought to be given out, and whatever may be said of this instance of employing outside copyists upon work of this character, it must be held that no charge against Foster & Freeman, or against either of them, is sustained in respect of any of these papers, either in procuring the papers themselves for their client, or in acting in any manner in collusion with others to obtain copies for any other purpose. Their clients had use for these papers; they made written requests for them which are on file; these requests were officially granted or publicly denied, and they received and have those papers the requests for which were granted, and have not received any of those the requests for which were denied.

Upon the close of the evidence and before the argument in this case, the complainants themselves stated in writing that they had become satisfied that Mr. Foster was without fault or blame in the premises, and requested in a formal manner that the charges against him be dismissed. Upon a careful consideration of the testimony it is held also that Dr. Freeman is without fault or blame in the premises. The charge of collusion is dismissed.

The question in the case of Mr. Simonds is not whether any of the decisions upon the various requests for copies were right, nor whether the giving of the copies upon these requests is in conformity with the general principles adverted to at the beginning of this opinion, nor whether all or any of the acts done by the chiefs of divisions or their subordinates in the office ought to be approved, but whether these copies were taken, not only improperly under all the circumstances, but for use in the practice of the law hereafter before this office. Of all the Drawbaugh papers of which Mr. Simonds has copies, the Bell Company has copies. The only harm that occurs to me, and none was suggested, which might come to the complainants or their client by the taking of these copies, would be the revelation of the particulars of the inventions described therein. Attention was not called in any of these papers to a single item or element the revelation of which caused the least inconvenience or could cause loss to any of the parties making the complaint. No use was suggested that Mr. Simonds might make of any revelation of secrets thus secured. No motive was pointed out why the copies were taken or may probably have been taken other than that stated by Mr. Simonds himself, as that upon which he took them. As the propriety of his official acts in issuing the Berliner patent appears to be brought in question, as he states, and as the original files of which he thus has copies were before him when rendering his decison and are, in a sense, the basis of his action in the matter now so prominently complained of in a case brought by the United States, and as the taking of these copies, under the circumstances detailed, had at the time the distinct approval of General Noble, the then Secretary of the Interior, and appears in itself to be reasonable, it must be considered that no ground for complaint against him exists.

The complaint is dismissed as to all the defendants.

GENERAL NOTES.

The telephone service has been extended to Cleveland Park, Long Pond, Mass.

Madison, Wis., is trying to get up a company to put in an automatic telephone exchange.

The new engine and generator in the power house of the Toledo, O., Electric Street Railway Company are ready to run. This new generator will give the company an additional 1,000 horse-power on all its lines.

The Winchester Avenue Electric Road, of New Haven, Conn., will make an extensive addition to its car house on Meadow street. The addition is made necessary by the increased traffic over the road, which has been during the last year 30 per cent.

The interest in the electric enterprise which was agitated some months ago by the citizens of Haverhill, Mass., and vicinity, has again been awakened and many are hopeful of having electric cars running from the city through that place to Nashua, N. H., ere many months have passed away.

A rather peculiar state of affairs existed at Harrisburg, Pa., a few days ago, says the Savannah *News*. The governor, secretary of State, attorney-general, adjutant general and several other State officers were all at the World's Fair, yet each was in direct communication with his office by long distance telephone, and directed the transaction of public business. Thus, while the State was temporarily without governing officers within its borders, the officers were in "speaking distance" of the capitol and attended to their daily duties. This instance of government by telephone is unique.

The Van Duzer-Mason Electric Steering Gear.

BY ENSIGN LEWIS S. VAN DUZER, U. S. N., IN "JOURNAL OF THE UNITED STATES NAVAL INSTITUTE."

This apparatus may be fitted either as a steering gear or as a device for controlling a steam engine or other form of motor. As a steering gear it is exceedingly simple. Two reversible motors are placed at opposite ends of a worm shaft. Traveling on the shaft is a nut, bearing a sleeve which slides on the tiller to allow of rectilinear movement of the nut. The power of the motors varies with the size of the rudder, the maximum anticipated pressure against it, and the desired speed of operations (*i. e.*, of moving the helm). Two motors are used instead of one as a measure of precaution. In case of the break-down of one, the other would be able to move the helm at a reduced speed. If the additional expense is not objected to, the motors should each be of size sufficient to develop the full necessary power, so that only one need be connected up at a time, the other being held in reserve. The carbon brushes of the reserve motor are drawn back, the current cut off and the armature allowed to revolve freely with the shaft.

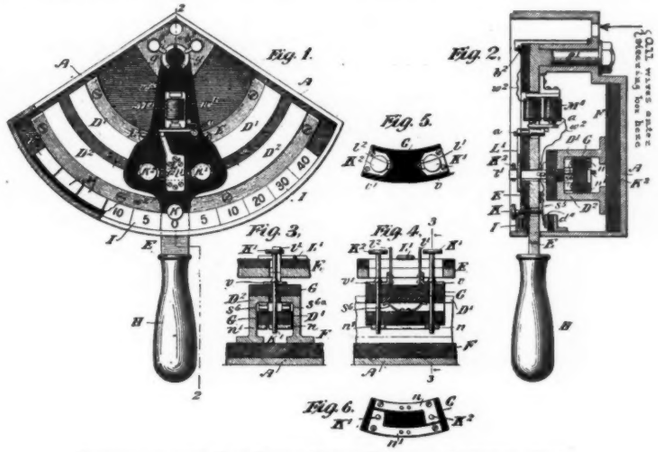
When used as a controlling device for directing the movements of a Williamson or other form of steering engine—steam, hydraulic or pneumatic—the motors, much smaller of course, are arranged on a worm shaft as before described. The worm actuates a gear wheel on the valve, or differential, shaft. The proper speed of turning the shaft is obtained by proportioning the gear wheel and pitch of the worm to the speed of the motor. It is further controlled by an automatic switch, actuated by the engine itself, and throwing in or cutting out resistance in the operating circuit.

The wiring and the steering box (Figs. 1 and 2) are alike for both electric steerer and electric controller, except when these engines are not fitted with a "differential." In such cases the method of wiring and the connections vary according to circumstances. Nearly all cases require slightly different leads and slightly different treatment, but the general plan is the same. The wiring in all cases consists of three circuits—the main or operating circuit; the contacting, switching or reversing circuit; and the cut-out circuit. The operating circuit alone carries a current of considerable electromotive force. It consists of two wires only, a direct and return, extending from the dynamo directly to switches or binding posts at the motor. The operating circuit may always, therefore, be thoroughly protected. The contacting or switching circuit consists of two direct wires with a common return. By means of a pair of magnets (M^2, M^3) it operates the switch a^1, which reverses the current from port to starboard, or starboard to port, as desired. Port or starboard here means direction only. To put the helm from 30 degrees starboard to 15 degrees starboard the current would switch to *port*, the movement being toward the port side. The cut-out circuit breaks the contacting or switching circuit when the helm reaches the desired position, and the contacting circuit then switches or breaks the main or operating circuit, and so shuts down the motor. The contact plates of the contact arc at the tiller (or steering engine) are so arranged as to permit of adjustment for electric lead to allow for the time required to operate the mechanism, so that the cut-out circuit really acts a short time before the tiller reaches the desired point; but by the time the motor is shut down the tiller will have arrived at its proper place. The exact amount of lead required is determined by experiment and is adjustable. It would never exceed half a second of time, and would generally be much less.

The steering box (Figs. 1 and 2) contains as many cut-out segments as are thought to be necessary to give perfect control of the helm, and the other cut-out arc at the tiller or steering engine is a duplicate of it as regards number of segments. One small wire is needed for each segment. The current in the contacting and cut-out circuits is very small, only sufficient to actuate the magnets operating the switches. These light currents are the only ones which need to go above the protective deck. If cut or short circuited no harm can result to the electric plant. Only one magnet—a weak one—on the operating lever, is located in the pilothouse, and no currents of high electromotive force need be brought near the compasses. The magnet is only momentarily in operation and ought not to effect the compass.

Any number of steering stations may be located about the ship. All should be shut off except while in use. The accompanying drawings are those made for the Patent Office, in accordance with Patent Office practice, but do not exactly represent the apparatus as it really exists. The motors shown are not reversible, and the contacts are not exactly as used in the gears now under construction.

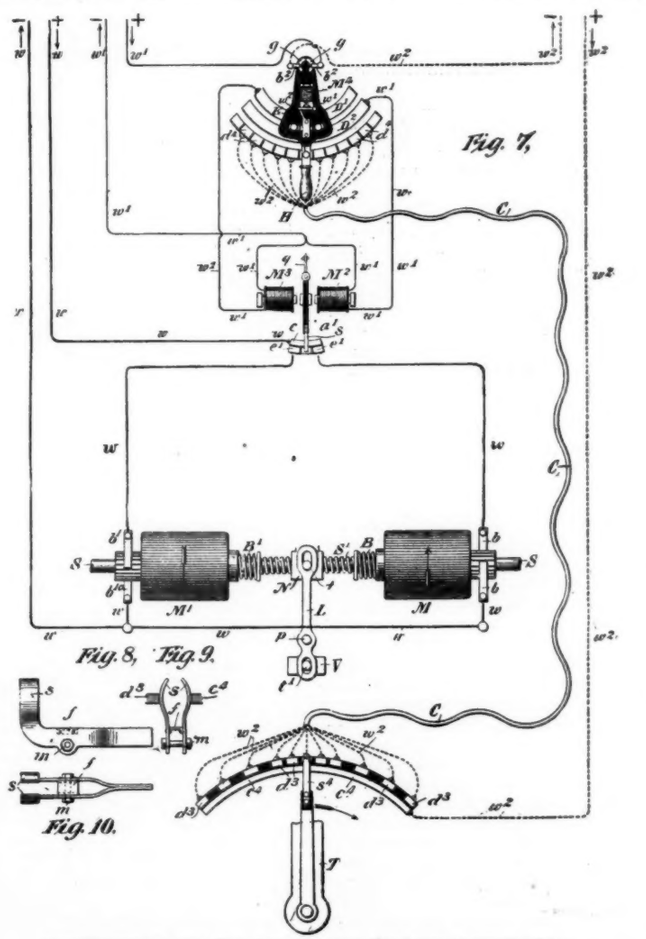
The advantages of electric control of the helm are numerous. With little additional weight any number of steering stations can be established, and they take up so little room that they may be placed anywhere. There is no restriction of position of the electric steering lever on account of leads for shafting or rope. The labor of steering is reduced to nothing, and in particularly difficult navigation the officer-of-the-deck



DETAILS OF THE VAN DUZER-MASON ELECTRIC STEERING GEAR.

may, if he chooses, steer the ship himself from any one of several steering stations, aloft if necessary, as a ship can be as readily steered, electrically, from the top or masthead as from the deck.

In the mechanism above described no parts are so delicate as to render them liable to injury by the concussion of firing or ordinary rough handling. All motions are positive, and all connections and contacts are accessible and adjustable.



CONNECTIONS OF THE VAN DUZER-MASON ELECTRIC STEERING GEAR.

The working of the apparatus is as follows: With the helm at 20° port, to put it to 30° starboard push the handle H (Fig. 1) to the right. The traveling block (Figs. 3 and 4) is held by the pressure of the springs s^6, s^{6a}, until the plate L^1 touches the spring l^1 and presses it against the head of the screw K^1. The function of the springs l^1 and l^2 is to furnish a yielding contact which will be maintained even if the lever H should spring back slightly. Through K^1 the circuit is completed and flows as follows: From the dynamo through b^2 to g, thence along top of steering lever to a, thence to L^1 to K^1 to n^1 (see Figs. 3 and 4), thence through s^{6a} to D^1, thence through w^1 to M^3 and back by w^1 (return wire) to the dynamo. Magnetizing M^3 the switch a^1 is drawn over and connects the main or operating current w with e^1. The operating current then passes through b^1 to b^{1a} and back to the dynamo, driving the motor M^1 and drawing the nut N along the shaft. If the nut N carries the tiller-sleeve (instead of, as in the drawing, working a valve for a certain form of engine) the thread on the worm shaft S^1 would be in the other direction. Supposing the thread to be in the proper direction, the tiller will then continue to move to starboard. The handle H, as stated above, is now at 30° starboard, when the tiller reaches d^3, which corresponds to 30° starboard (one edge of d^3 being at about 27° and the other at 33°, 3° representing the *lead*), the cut-out circuit is completed as follows: From the dynamo to b^2, thence along the top of the steering lever H to M^4, thence to K, to S^3, to d^4 (Fig. 2), to d^3 (by its own individual wire in the cable C), thence by s^4 to the long arc c^4 and back to the dynamo by the single return wire w^2. When this current magnetizes the magnet M^4 on the steering lever H, it draws the lever-armature a over against the light spring shown and breaks the contacting circuit. When this circuit is broken the magnet M^3 is demagnetized, the switch a^1 is released and is thrown to middle position by the flat spring q, thus breaking the main circuit and stopping the tiller.

When the main or operating current is of considerable electromotive force (*i. e.*, when the apparatus is used as a steering gear and not as a controller) the switch a^1, instead of breaking it abruptly, shuts down the motor through graduated resistance in order to avoid sparking. The adjustable contact springs are shown in Figs. 8, 9 and 10.

The General Electric Company are manufacturing the above apparatus under contract with the owners of the patents. The American patent bears the date of March 7, 1893; the British patent has been applied for, but probably will not be issued for some weeks yet.

An Electric Feeder for the Gatling Gun.

Dr. R. J. Gatling, of Hartford, Conn., whose revolving machine gun has attained a world-wide reputation, has applied a feeder for the gun, which renders it still more convenient and useful than ever. On a strip of tin are placed 20 smokeless powder cartridges, each held in place by bits of the tin that are turned up for the purpose. These slips are put into a horizontal opening, and as they are drawn through, the cartridges are stripped off and placed in position to be thrust into the chambers. The motion is positive, and there is no failure in any part of the movement. The strips with cartridges attached can be compactly packed, and a much larger amount of ammunition can be carried with the gun than by the old way. The gun can be fed by these strips with the greatest rapidity. With them it has been fired 3,120 times in a minute, and when turned by a little electric motor attached to the breech, it can be fired 5,000 times a minute.

The improved feed referred to was developed and applied to the identical gun used in the United States Government test, in the shops of the Dwight Slate Machine Company, of Hartford. The patents are in the names of two of their employés, and will be assigned to the Gatling Company. The Dwight Slate Machine Company are now engaged in adapting the electric motor attachment to operate the feed. The electrical part of this is made by the Eddy Electric Manufacturing Company, of Windsor, Conn.

General Electric.

The Boston *News Bureau*, whose financial information is usually accurate, has this to say of General Electric in its issue for July 22:

The General Electric Company has been endeavoring to reduce forces for two months, but many departments have been so far behind in orders that little reduction could be effected in the labor accounts. Yesterday, however, 125 men were laid off at Lynn, and it was hoped by the end of the week 400 men could be laid off. The company has had about 3,700 employés at the Lynn works.

There seems to be a great deal more interest in New York in the decline of General Electric than in Boston. A careful investigation warrants us in declaring that General Electric certificates are not in Boston a factor in bank or trust companies' loans. For the most part the shares are paid for, and if borrowing is done by the owners it is upon other securities. Connecticut and Lynn investors have been recent buyers of General Electric shares for cash.

The great factor against General Electric is that it is one of our newest industries, and if industries are to be paralyzed, General Electric must suffer with the others, and suffer by reason of the newness of its credit and stockholding. It is involved only with what affects all other industries. Being among the most recent it must carry larger cash balances and larger assets than any other manufacturing company, but in the end it will be all the better for a period of enforced economies.

It is figured that the General Electric Company in good times ought to do a business of $25,000,000 per annum, but that it can continue dividends in times of depression with only $15,000,000 of gross business.

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Brush Electric Co., apparatus	iii
Buckeye Engine Co., engines	ix
Butler Hard Rubber Co., battery cells	viii
Carpenter Enamel Rheostat Co., rheostats	vii
Central Electric Co., supplies	iii
Clark Electric Co., arc lighting	x
Columbia Incandescent Lamp Co., incandescent lamps	vi
Cutter, George, electrical supplies	vi
Dixon Crucible Co., belt dressing	vii
Edison Decorative and Minor Lamp Department, incandescent lamps	308
Electric Construction and Supply Co., Ward arc lamps	iii
Electric Selector and Signal Co	x
Electrical and Mechanical Engineering and Trading Co., contractors	x
Electro-Light Engraving Co., engraving	iv
Falls Rivet & Machine Co., friction clutches	ix
Fidelity Carbon Manufacturing Co., carbons	x
General Electric Launch Co., electric launches	iv
Globe Iron Roofing and Corrugating Co	308
Greeley & Co., The E. S., supplies	iv & x
Hammond Cleat and Insulator Co., cleats	ix
Harrisburg Foundry & Machine Works, engines	ix
Helios Electric Co., arc lamps	x
Holmes, Booth & Haydens, insulated wire	v
Johns Mfg. Co., H. W., vulcabeston	ix
Leavitt Motor Co., motors	vi
Leclanche Battery Co., batteries	vii
Leffel & Co., James, water wheels	ix
Lehigh Valley Creosoting Co., creosoted lumber	iv
Marshall, Wm., condensers	iv
Mason Electric Co., primary batteries	vii
National Electric Mfg. Co., dynamo-electric machinery	iv
National Pipe Bending Co., feed-water heater	vi
New England Butt Co., braiding machinery	v
New Jersey Lamp & Bronze Works, electric and gas fixtures	viii
New York and Ohio Co., incandescent lamps	viii
New York Belting and Packing Co., rubber belts	viii
New York Electrical and Development Co	x
New York Insulated Wire Co., wires and cables	x
Onondaga Dynamo Co., electrical apparatus	v
Ostrander & Co., W. R., supplies	x
Partrick & Carter Co., electrical supplies	308
Phillips Insulated Wire Co., insulated wire	v
Phosphor-Bronze Smelting Co., castings	vii
Photo-Engraving Co., engravings	308
Pope, Read & Rogers	308
Porter Electric Motor Co., electric motors	iv
Queen & Co., electrical instruments	308
Reed & Co., F. E., lathes	iv
Ries Electric Specialty Co., regulating socket	v
Robinson & Orr, steel rails	308
Royce & Marean, electrical supplies	iv
Russell & Co., steam engines	ix
Schuyler Electric Co., arc lighting	v
Shawmut Fuse Wire Co., fuse wire	308
Shoemaker, Homer, attorney and counselor-at-law	iv
Siemens & Halske Electric Co., electrical machinery	iv
Standard Paint Co., insulating compounds	viii
Tyndall, Wm. D., attorney	x
Washburn & Moen Mfg. Co., wire	308
Western Electric Co., supplies	iv
Weston Electrical Instrument Co., measuring instruments	vi
Whitney Electrical Instrument Co., instruments	vi
Wilson, Fremont, electrician	308

Dr. Nettie E. Jenkins, a woman physician, witnessed the latest electrocution. She is described as a woman of "strong mental qualities." She must be.

The first important electrical failure, caused by the stringency of the past 60 days, is reported from Baltimore. It is thought that 90 cents on the dollar will be realized.

There seems to be a growing disgust in this city with the Broadway cable railway. Electricity, as we have before predicted, will yet be the motive power on this great thoroughfare.

THE ELECTRICAL REVIEW has always contended that the chief objection to electrical executions was the necessarily complicated apparatus and its constant liability to get out of order or meet with accident. Auburn's latest horror is additional proof of the soundness of this position.

THE HORROR AT AUBURN.

Fame paused a moment at the door of the manager of the Auburn Electric Light Company. He should have told the bungling executioners of the negro criminal Taylor that he manufactured electric current for supplying light and power, not to kill human beings. His name would have been on every lip, and attention would have been called with the suddenness and impressiveness of the lightning's flash in the darkness of night to the weak point in electrical executions — the constant probability of accident. From boiler to engine, to dynamo, to switchboard, with its complication of contacts and instruments, and to the death chair and its victim—always of unknown powers of resistance to the electric current—is presented a chain of units that the slightest mishap may break.

Electricity should never have been used to replace the hangman's rope, and we expect to see this abominable law yet erased from the statute books of New York.

PURIFICATION OF OUR WATER SUPPLY BY ELECTRICITY.

Ever since the reports of the fearful ravages of the cholera in Europe and the few alleged cases discovered in this city, the public have been somewhat uncertain of what the summer and the expected increase in foreign visitors to the World's Fair might bring forth.

The most fruitful source for contagion is undoubtedly the water supply. Few people care to take, what others choose to call, trouble, to sterilize their drinking water. Many filter it and feel satisfied that they have done their duty to themselves.

It seems, therefore, that the municipal government must take upon itself the onerous duty of furnishing water which has been thoroughly sterilized and thus rendered innocuous.

Mr. Albert E. Woolf, a promising inventor of this city, who has made many improvements in arc lights and other mechanico-electrical devices, has turned his attention to an electrolytical method for sterilizing our impure water supply.

The process is extremely simple; he passes sea water or brine over and between a number of electrodes, the positive being of copper thoroughly coated with a thin layer of platinum, and the negative being of hard retort carbon. The experimental installation at Brewsters, N. Y., a town having a stream, a part of the Croton water shed, consists of a steam plant and engine with a capacity of 15 horse-power, driving a Zucker & Leavitt dynamo, furnishing a current of 700 amperes and five volts.

The decomposing tank containing the brine holds about 1,000 gallons, and is supplied by a reserve tank holding over 3,000 gallons.

The process is entirely automatic, the time of the electrolyzing of the brine being so arranged that when the process is completed the sterilizing water flows off to the place where the disinfecting solution is required.

In the decomposition of the brine or sea water which contains the chloride and bromide of sodium, the sulphates of potassium, lime and magnesia and the chloride of magnesia, is accomplished by means of this heavy current the production of hypochlorites and hypobromides. Sodium hypochlorite, known under the more familiar name of Eau Javelle, is a compound which readily gives up its chlorine, which, as is well known, in its nascent and even free condition, is a most powerful disinfectant and deodorizer.

The principle upon which are founded the methods of this process, is the destroying of bacteria and the decomposition of noxious salts and albuminoid ammonia into harmless salts.

By means of many experiments on the introduction of this decomposed brine into affected water, its disinfecting power was found to be greater than that of many other effective disinfectants, and in point of economy far less than any others. It is itself perfectly harmless.

This 15 horse-power plant at Brewsters is calculated to serve for a town of from 30,000 to 40,000 inhabitants.

Several prominent New York capitalists have taken the matter in hand and are pushing it to completion and adoption. Dr. Cyrus Edson, chief of the medical staff of the New York Board of Health, has made a series of thorough experiments with this Woolf disinfectant and they have shown that a decided destructive effect is the result of its application to living micro organisms.

Calculations regarding the expense of operating a plant of this kind have been made and these estimates have shown that the cost of electrolyzing 100 gallons of sea water is but one cent. This is of course on a small scale.

Dr. Edson has shown that by introducing in 24 hours 24,000 gallons of electrolyzed brine into a stream running 30,000,000 gallons per day, a disinfection was produced which gave the following remarkable results:

PARTS PER 100,000.

Sample A.	*B.*	*C.*	*D.*
Nitrogen in nitrites..... .0004	.0001	None	None
Nitrogen in nitrates..... .0138	.0250	None	None
Albuminoid ammonia... .00625	.00625	.0050	.0050

Sample *A* was taken from the stream 15 feet above the place where the disinfectant was introduced; *B*, *C*, and *D* were taken 10, 15 and 20 feet, respectively, below the points of supply.

These reports are so encouraging that it is expected Dr. Edson will recommend to the Board of Health the adoption of the Woolf disinfecting system.

LETTERS FROM A LABORATORY.—LVI.

BY JULIAN A. MOSES.

Whenever an element of danger crops up in our midst, there are scores of wide-awake inventors who are on the alert for such opportunities, and who construct and patent devices for the prevention of the danger to life and limb. It has now become a recognized fact that a quickly moving vehicle, no matter what may be the motive power, is a menace to the security of pedestrians. No amount of care and watchfulness will ever produce a total freedom from accidents, and those devices which require the intervention of a human agency can never be perfect. Life guards or fenders on trolley or other cars should be operated automatically; no amount of vigilance in conjunction with apparatus which is incapable of causing immediate cessation of motion will prevent accidents.

The fact that life-guards are necessary in crowded thoroughfares is obvious. Too many accidents, several resulting in deaths, have occurred, to enable any one, no matter how pecuniarily interested, to avoid taking cognizance of the fact.

Accidents due to the introduction of the so-called rapid transit are of daily occurrence, and the factor of astonishment, to cause a remedy of the evil, has almost entirely disappeared.

It is simply a case of familiarity breeding contempt.

It is wrong that a matter of such grave importance should be made the subject of a jest. Levity seldom adds to the seriousness of a danger. One of the Eastern journals commenting upon the danger of the trolley, says:

"In the city of Mexico the street railway company runs funeral cars. In some of the cities of the United States the street railway companies are also in the funeral business, but they only furnish the body."

No matter what manner of prevention, but something should be done by the car companies to reduce the liability of accident to a minimum.

Reports are coming from all parts of the country of successful trials of fenders, the inventions of different men. A recent series of experiments in Massachusetts has proven beyond a doubt that the succesful operation of the lifeguard is a *fait accompli*. Nothing is left now for the traction companies to do other than to adopt the fender, which is shown to be the most efficient in its operation. Municipal or State legislation should be brought to bear upon the matter, and the employment of the fender should be made compulsory.

A person intimately connected with the Broadway Cable Company was heard to say, during a conversation upon the advisability of adopting a safety fender for the Broadway line:

"Why, if the people knew that they couldn't get hurt by the cars, we would be shoveling them up by the ton every day of the year."

If this then is the case, and if during the process of shoveling the individual be not hurt in the least, why is it that the adoption of the fenders is not immediately acted upon?

A pneumatic rubber buffer would make the life-saving perfectly harmless. The mere mechanical details only are lacking, and a few experiments would, in short order, permit any enterprising, and, in this case, philanthropic inventor, to place well-earned laurels upon his brow, and enable him to benefit himself as well as the apprehensive community-at-large.

The horse will shortly disappear from the scene, and the fender will become as essential to the entire outfit of a moving car as the motive power itself.

All that is necessary is a little energy put to the best advantage. Let a person be caught between a moving car and the innumerable trucks and wagons that throng our thoroughfares, and I feel sure that he will realize the necessity for life-saving apparatus. Personal experience counts more than all other arguments that may be brought up in the most lurid lights. Let each citizen put forth a plea for the adoption of the fender, so that "out of this nettle, danger, we may pluck the flower, safety."

CORRESPONDENCE.

OUR BOSTON LETTER.

The Windsor Locks Electric Company, of Windsor Locks, Conn., has decided to double the capacity of its plant.

Mr. Wm. F. Breidenback, of the F. P. Little Electrical Construction & Supply Company, of Buffalo, N. Y., has been in Boston for the past ten days. Mr. Breidenback is negotiating with some of the supply houses here for the handling of the Kester arc lamp in New England territory.

The Springfield Electric Light Company, of Springfield, Mass., are contemplating means for introducing the electric current more generally among the residences of the city for lighting, heating and cooking purposes. Recent devices for converting electrical energy into these various channels have been perfected, and their practical utility has been thoroughly demonstrated. It only remains for the stations to furnish current at a lower rate to the consumer to have electricity adopted very generally for domestic use, as its advantages are freely admitted, and the question of cost is what is principally agitating the public.

The Editorial Mention in a recent issue of the ELECTRICAL REVIEW that a better system of brakes for heavy electric cars was badly needed under present conditions, has brought out the fact that a patent on a quick acting device of this kind has recently been granted to Nathaniel Lombard, of Boston. Henry A. Clark, the well known treasurer of the Eastern Electric Cable Company, of this city, is also largely interested in the invention, which fact alone is a strong indorsement of its merits. Briefly stated, the mechanism consists of a rotary wheel or drum fixed upon the axle of the car, preferably the one connected with the motor, and a pair of friction shoes pivotally secured to a collar loosely upon the axle and adapted to grip the drum. The collar is operated by a lever attached to the brake-rod chains, and it requires little or no effort on the part of the motorman to operate it, the power being derived from the momentum of the car itself. The mechanism is extremely simple, and can be attached to any car without alteration or change in the running gear.

The Petition of the Newtonville and Watertown Electric Road, for permission to extend their system, came up before the board of aldermen on the 17th, and as no opposition was offered, it was referred to the committee on railroads. It is seldom that an electric road, or any other progressive enterprise, for that matter, meets with the general and hearty support of the public which has been granted in this instance. The road from its inception has been hailed as a public benefaction by the property owners and residents along its route, and the several towns connected by the line have vied with each other in efforts to show their appreciation of the benefits they were to receive. The first car to run over the line, as new sections were completed, was met by enthusiastic crowds, fireworks and general rejoicing. It must be very gratifying to the projectors of a new road to feel that they have such hearty support from the people on whom the success of their enterprise depends, and it is certainly rare enough to make it thoroughly appreciated by them.

The Lynn and Boston Electric Road have equipped a number of their cars with an air brake similar in operation to the Westinghouse brake used on steam roads. The compressed air is furnished by a pump underneath the body of the car and connected with the axle. The cylinder is regulated for a pressure of 32 pounds, which is kept constant by a valve, allowing the air to escape after this point is reached. By a very slight movement of a lever from right to left the motorman can throw the whole power of the brake against the wheels, and a car running at the rate of 10 miles an hour can be stopped within its own length. Reversing the lever allows the air to escape and loosens the brakes, and the cylinder is again filled and ready for action by the time the car has traveled a distance of 40 feet. This matter of suitable brakes for electric cars is one of considerable importance, and appliances of this nature should be kept fully abreast of the other improvements in the service. Electric cars, from their weight and momentum, are very different affairs to handle from the ordinary street car, and devices for properly controlling the speed and bringing them to a stop quickly, if necessary, are as important as the development of the speed itself.

Boston, July 29. H. G. T.

A New Storage Battery.

The Consolidated Storage Battery Company, of New York, and the Electric Storage Battery Company, of Philadelphia, are arguing with each other about a new secondary battery, the invention of Mr. W. W. Gibbs, president of the latter company, and which, in the opinion of Prof. C. F. Chandler, does not infringe the Brush patents.

Electrocution or Vivisection?

It is a noteworthy fact that post-mortem examinations have been held on the bodies of electrocuted criminals in a very short time after they were shocked.

Who, among us all, can positively and certainly declare whether life has left the body after the passage through it of an electric current? A shock of 2,000 volts will undoubtedly kill some men, and may only stun others.

Is there a competent physician who will state upon his honor that the criminals who have been electrocuted in New York State were dead when they were carried from the chair?

In Taylor's case, the appearance of his body when placed in the death chair the second time gave evidence that the doctors had well performed their work with morphine and chloroform. There was nothing left for the electric current to do.

Is the Empire State executing its criminals by electricity or by vivisection?

General Electric.

Late on Friday afternoon, July 28, after a protracted meeting of the board of directors of the General Electric Company, the following official statement was issued:

At a meeting of the board of directors of the General Electric Company, it was decided to offer to the stockholders securities in the treasury of the company sufficient to liquidate the entire floating debt, amounting to about $4,000,000. Of the amount necessary to underwrite the above 75 per cent. has already been subscribed.

Conspicuous among the underwriters is the firm of Drexel, Morgan & Company, F. L. Ames, of Massachusetts, Hamilton McK. Twombley, D. O. Mills, T. Jefferson Coolidge, Jr., and H. L. Higginson.

The officers of the company also stated that the quarterly dividend of two per cent., which has been declared payable next Tuesday, will be paid in cash.

Universal Circulars.

The E. W. Bliss Company, 17 Adams street, Brooklyn, N. Y., have sent us a set of five circulars printed in English, French and German, describing their open-back power presses, the "Stiles" power punching presses, double-crank power presses, toggle-joint drawing presses, and the "Stiles" drop hammers. They are for the purpose of enabling the company's foreign friends to understand the details of the Bliss exhibits at the World's Fair. Such enterprise is commendable in the extreme, and doubtless foreign visitors will show their appreciation by leaving a few orders with the E. W. Bliss Company before the Fair is over.

Two More Lamp Factories Closed.

Following up recent decisions of the United States Circuit Courts in the matter of the Edison incandescent lamp patent, the General Electric Company on the 28th of July secured restraining orders, under a decision of Judge Ricks, of the United States Circuit Court for the Northern District of Ohio, against the Buckeye Electric Company, of Cleveland, Ohio, and the Packard Lamp Company, of Warren, Ohio, both manufacturers of incandescent lamps which, it is claimed, infringe the famous Edison patent. The orders of the court close the factories of the two companies in question.

The Southern Electric Company Fails.

The Southern Electric Company, of Baltimore, Md., made a voluntary assignment on July 24 to Morrill N. Packard. Failure to collect overdue accounts made it impossible for the company to meet its obligations. The assets of the concern are estimated at $175,000; liabilities, $100,000. Mr. Packard filed a bond for $35,000. The company was incorporated in 1891. The officers of the company are James F. Morrison, president; John S. Boyd, secretary.

We understand that the Manhattan Railway Company have ordered reports submitted to them relative to equipping the elevated roads of this city with electric power. The operation of these roads by electricity, we predict, will be eminently satisfactory to both the stockholders and the public.

Electrical News from Paris.

THE TELEPHONE SYSTEM — PHONOGRAPHS PLEASE THE PARISIANS — A FRENCH MACHINE SHOP — A RIDE ON A GASOLINE CARRIAGE.

Telephone service in Paris costs $125 a year. The instruments are good, the wires pretty much underground, but, oh! for an American operator. If I ever get back I'll never talk in a minor key to her if she fails to give me the number I want in 10 seconds. A new "Central" is being built, but one now may wait an hour in vain for a number. The telephone as a toy is much appreciated. In some rich houses connection is made with the theatres, and the hostess says to her friends, "Wouldn't you like to hear a little of the Grand Opera, or the Comedie Francaise, etc.?" It is far superior to the inevitable amateur pianist or vocalist that is inflicted on suffering mortals by interested friends at home. One is not obliged to listen and applaud a telephonic soiree. Anything of the toy nature takes with Parisians. The improved phonograph pleases them just as a rattle does a baby. In one office I found two phonographs and not a single typewriter in sight.

The machine shops of the well known electrical manufacturing firm of A. Mors & Company are near the Eiffel tower on the Avenue de l'Opera. Near the gate I saw half a dozen 16-foot boats of considerable depth, with room for two only. The machine shops present a sight entirely different from an American factory. One is amazed at the variety and quality of work done on regular lathes, there being almost no special tools. Large numbers of small engines are built and some for launches of tandem compound type of one to two horse-power were unique.

While taking leave a horn sounded, a man opened the large gate and a four-wheeled carriage rolled in bringing one of the firm. I looked for the horse. He was thin as air or had some magic ring, for he was invisible. There was no pushee, no pullee, but move along just the samee. It was a gasoline motor that made the wheels go round. To start up, two little lamps are lighted, the engine turned over by a crank, and the gasoline turned on. The engine at once comes to full speed and regulates itself like any gas engine. Enough oil can be carried to go from Paris to Brussels, and, in Europe, it can be bought in any large town. A quart an hour is more than enough. A little water is used for cooling the cylinders, and this is vaporized in a perforated box under the carriage, thereby obviating dripping water or escaping steam. The engine runs continuously and the power clutch can be set so that the carriage goes forward or back or remains still. It did not require a second invitation for your representative to take a seat. It was with some trepidation that I waited for the start. The carriage was out of repair, and no one knows what a broken down machine may do. The driver quieted my fears by saying that he was taking the carriage to be painted. Out we turned into the street and bowled along merrily. By cutting down the gas used the speed could be reduced to less than a walk. A hand lever brake and a band brake operated by the foot gave perfect control of the carriage. A boy ran out to catch a ride on behind; he was shouted at vigorously. A dog came out a block further on; he was simply ignored, for the machinery and wheels were guaranteed hydrophobia proof. The steering on a level road is easy, but little hollows that affect one wheel at a time twist the steering gear which controls the two front wheels. We went up and down hill and on a level from seven to ten miles an hour, and the heaviest grades in Paris were climbed with ease. There are twenty or more of these carriages in use in Paris or vicinity, and the little ride I took in one that needed painting, convinced me that automobile carriages are practical. Compared with storage batteries there are advantages and disadvantages. Let the storage batteries come to the front for this work. Next to flying let me ride in an electric carriage over a good road. FRANK M. GILLEY.

Wall Street and the Electrical Stock Market.

The past week in Wall Street has been one of great irregularity. About the middle of the week considerable buying was done for small investors in odd lots of industrial and railroad stocks, transactions in this respect reaching as high as 15,000 shares a day, in blocks of from one to 100 shares. The character of the sales indicated that the stocks were being bought for investment purposes solely.

On Wednesday and Thursday the Stock Exchange was compared to a bargain counter, General Electric, at its quoted price, showing 24 per cent. on the investment.

The action of the market on Friday demonstrated that the radical change in the character of the dealings on Thursday had taken away the absolute control of prices from the bears. Of course, the speculative element, that is bent upon depressing prices, is still, and will be for a long time to come, an influential factor in the market.

The speculative liquidation is practically over, and prices have sunk to so low a level that transactions for investment are likely to be more largely for buyers than sellers.

The business of the week on Wall Street was another demonstration of the uncertainty of stock dealing. On Wednesday night the bears were, as they have been for weeks past, in absolute control of the stock market.

At the close of business on Thursday the victors of the previous day were on the run. The event that the bulls had hoped for came to pass—that is, operators on the short side who had become over-confident by reason of their long-continued success found there was a limit to the liquidation of securities, and also a range of prices attractive to actual buyers.

The demand for small investors purchasing on investment accounts was extremely pronounced in General Electric and Western Union, both dividend paying stocks. It is reported that Western Union is reducing expenses in every possible way. Chiefs have been put down one grade and their salaries reduced $5 to $10 on account of dull business. This is said to be the case in all the big cities.

On Friday afternoon the directors of the General Electric Company were in session until 4.30. One of the counsel for the company said he had not heard of any action in regard to a receiver for the company.

Saturday morning witnessed a very exciting scene at the opening of the Stock Exchange. One of the biggest crowds in the room was around the General Electric post. The stock closed on Friday night at 35½, having rallied to that point from 31¾, the lowest point. Most people looked for a better market on Saturday morning. Among the crowd of brokers were two named Sproule and Savin. Savin was bidding for General Electric away below the closing price, and other brokers were bidding the same way. There was no stock offered until just before the chairman's gavel dropped, when Savin bid 30 for 500 shares. Sproule, to the astonishment of every one, cried "sold" before any higher bids could be made. Threats were made to take the case before the governing committee, and doubts were also heard as to the genuineness of the transaction, which was regarded as a bear movement to fix a low opening price for the stock. The next sale after this extraordinary transaction was at 39, such a fluctuation being almost unheard of on the Exchange, and emphasizing the queer nature of the first transaction. The stock then sold at 38 to 37½ and back to 38.

The closing prices of active electrical stocks on the New York Stock Exchange at the close of business on Saturday, July 29, were as follows:

	Bid.	*Asked.*
General Electric	37⅛	38¾
Western Union	68¾	69

The closing quotations of electric stocks on the Boston stock exchange on Saturday, July 29, were:

	Bid.	*Asked.*
Boston Electric Light	—	105
Edison Electric Illuminating	—	130
General Electric	37	37⅝
Westinghouse Electric	—	17
Westinghouse Electric pf	—	38
American Bell Telephone	—	175

Some Physiological Experiments with Magnets at the Edison Laboratory.

READ BEFORE THE AMERICAN ELECTRO-THERAPEUTIC ASSOCIATION BY FREDERICK PETERSON, M. D., AND A. E. KENNELLY. — FROM THE "NEW YORK MEDICAL JOURNAL" FOR DECEMBER 31, 1892.

Magneto-therapy has not gained such widespread application as has electricity in medicine, nor has it won to any great extent the confidence of the medical profession, for its effects are even more occult and less easily demonstrable than, for instance, the trophic influences of galvanism in poliomyelitis and progressive muscular atrophy. At the same time magneto-therapy has its adherents and earnest promulgators, to which any one will bear witness who has observed the transfer of singultus by a magnet from one girl to another in Charcot's dramatic realms at the Salpêtrière, or who has at the Poliklinik watched Benedikt carefully adjust a one foot horseshoe magnet to the hyperæsthetic spine of a hysterical girl. There are many lesser men than these who have implicit faith in that mysterious force, and there is no dearth of theories to explain the effects of magnetism upon the human organism. Professor Benedikt has taught that erethetic forms of hysteria are better

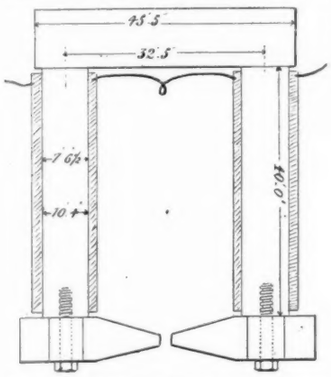

FIG. 1.—PLANE SECTION OF MAGNET THROUGH CORE AXES. NOT DRAWN TO SCALE.

treated by the magnet than by electricity, hydrotherapy, or drugs. A magnet being applied to the sensitive vertebræ, without removal of the dress, the irritable patient soon becomes quiet and even quasi-paralyzed. The magnet, therefore, "increases the resistance to conduction in the motor nerves." The muscles gradually relax, the respiration becomes sighing, consciousness slowly disappears; the resistance to conduction in motor nerves "could easily become absolute." The two poles have different effects. Sometimes one pole to a hyperæsthetic ovary fails to relieve pain, whereas a change of the poles causes its speedy disappearance. According to him, the magnet must be employed with due caution, since patients may be injured by it.

The status of magneto-therapy in America may be inferred from some quotations from the third edition of Robert Bartholow's *Medical Electricity*, 1887. Under the caption of Physiological Effects of Magnet Applications, he says: "We know that a current circulates in a magnet. If a powerful horseshoe magnet is brought near to the skin, opposite electricities are attracted to the poles and currents are induced. About the point of application, therefore, the skin will be acted on directly by the magnetic current and by an induced current. The production of physiological effects, which can be recognized, is, therefore, merely a question of the magnetic strength."

He then quotes Dr. Vansant as assuming the body to be diamagnetic: "By applying north and south polarity to different parts, very extensive subjective impressions are experienced; they are of two classes—of heightened organic activity, and the opposite condition."

He then adds: "That impressions of a very decided kind are produced by the application of strong magnets is evident in the experience of Dr. Proust and Dr. Ballet, who continued a course of investigation begun by Charcot at Salpêtrière." They ascertained that magnets could not be applied with impunity, for, if applications were prolonged, pains were felt in the epigastrium and thorax, making respiration painful, digestion was disordered, and boulimia brought on. These results were so uniform that there seemed to be no doubt of their genuineness in the minds of the investigators.

Under the heading "Therapeutical Application of Magnets," Dr. Bartholow quotes Dr. Hammond as preferring a horseshoe magnet, and advising that several of the same size be kept, so that by clamping them together more power can be obtained. The author adds: "Hammond insists on the necessity for the application of both poles in many cases, and, therefore, uses the horseshoe magnet."

"Hammond has used magnets in nine cases of chorea, in two, 'complete cures being produced in a few minutes.'"

"In two cases of hemiplegia with hemianæsthesia, Hammond had very surprising results from the application of horseshoe magnets, the sensibility returning immediately, and in one the hemiplegia was recovered from in a few hours."

The magnets used by physicians are generally those of a horseshoe shape, varying from a few inches to a foot in length, and are the so-called permanent magnets. They exert a traction force equivalent to several ounces, and sometimes to from one to three or four pounds.

Electro-magnets can be made to sustain two hundred pounds to each square inch, or 14 kilogrammes to the square centimetre of active surface on either pole—that is to say, 28 kilogrammes to the square of active surface on either pole, if both poles are alike and share the load.

While rather skeptical as to the practical utility of the magnet in medicine, it occurred to us that if there was any truth whatever in the claims made by various distinguished authorities, if this interesting and undoubtedly powerful force had any effect at all upon living organic matter, we were in a position to demonstrate its physiological effects by means of magnets of enormous power placed at our disposal at the Edison Laboratory, at Orange, N. J., through the kindness of Mr. Edison. Accordingly we made experiments which we detail below, and which we consider as conclusive, in that they have been made with magnets of a strength possibly never before used for such purposes. The description of the magnet employed for preliminary experiments is as follows (Fig. 1):

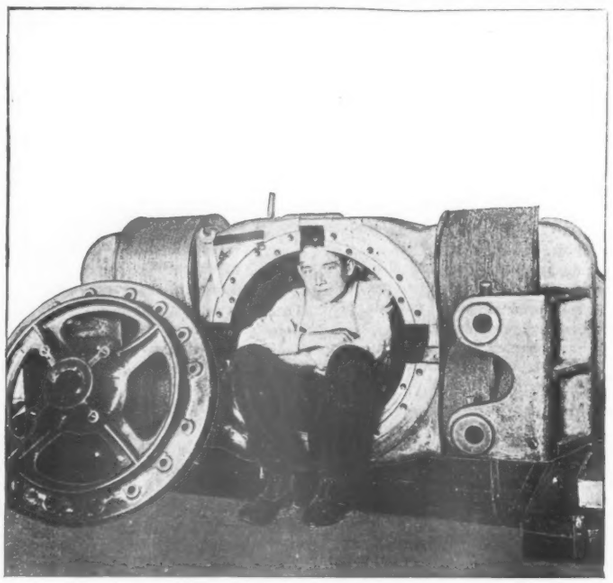

FIG. 2.—SHOWING FIELD MAGNETS IN WHOSE CYLINDRICAL CAVITY A DOG WAS PLACED. THE POWERFUL ATTRACTION OF BOLTS AND CHAINS IS DISTINCTLY NOTICEABLE. THE CIRCULAR BRASS COVER OR DOOR OF THE CAVITY IS SHOWN AT THE SIDE.

It is of wrought iron throughout, and its principal dimensions are represented in the sketch in centimetres. Roughly speaking, it is about a foot and a half wide by two feet long and requires two men to lift it. The cross-section of the core is 49 square centimetres. The vertical angle of the cones is 36 degrees, and the diameter of their plane faces 0.75 centimetres. There are 2,728 turns of wire on each limb, making 5,456 in all, and the current employed in exciting it was approximately 4.5 amperes. The pole faces were 1.20 centimetres apart, and it was between them that objects were placed for observation either with the naked eye or with the microscope. The intensity of the magnetic field between these poles was about 5,000 C. G. S. lines to the square centimetre.*

A drop of water placed on a glass slide in this field was visibly distorted in shape by the magnetic force.

The stage of the microscope wasremoved and wooden supports substituted. It was necessary to clamp the microscope down to the table to prevent its being drawn upward to the poles.

Nothing peculiar was noted in the effect upon iron in its finest powdered form—iron by hydrogen. It behaved just as iron filings would do, being strongly attracted. Iron by hydrogen placed in water was observed to be polarized by any ordinary magnet under the microscope.

Dry powdered hæmoglobin exposed to the strong magnetic field above described was not visibly affected by it. The iron it contains, however, is exceedingly minute (0.42 per cent.).

It was then thought possible that the iron in loose combination with fresh hæmoglobin in the blood corpuscles might be affected. Several experiments were made with both human and frog's blood. The blood, placed on slides and covered with a cover glass, was subjected to the strongest magnetic influence obtainable, and failed to show the feeblest traces of polarization, movement or vibration.

It must be borne in mind that we were using an electromagnet which we magnetized and demagnetized at will. First one would make the observations, the other experimenter attending to the current; then they were repeated and verified by the other on our changing places.

Living ciliated epithelium from the pharynx of a frog was now in like manner subjected to the magnet, and its behavior watched under the microscope with a high power objective, as the poles were magnetized and demagnetized by the making and breaking of the 120-volt current in the huge coils. The magnet had absolutely no effect upon the delicate ciliary movement, which kept on continuously, nor did it cause the slightest change or vibration in the cells themselves, suspended in the saline solution. After the magnetic observation a mild continuous electric current of one to two milliamperes C. S. was carried through the microscopic field containing the moving ciliated cells, and this also had no effect whatever upon the movement.

Another frog was now taken and curarized, fastened upon a pasteboard frog-plate and the web of the foot stretched in the usual manner to show the circulation of the blood in the capillaries under high power. As before, the object to be observed was placed between the poles of our magnet and the microscope focused upon it. The poles had to be separated somewhat farther to admit the large foot of the frog. With the clearance thus employed to allow of inserting the frog's foot the magnetic intensity was reduced from 5,000 C. G. S. lines to the square centimetre to 1,500 C. G. S. lines to the square centimetre. Repeated observation by both of us failed to demonstrate the feeblest influence of the magnet upon the blood cells or their movement in the vessels. At this point we determined to note the effect of the continuous current upon the circulation. A fine copper wire was placed upon one toe and another wrapped in moistened filtering paper above the ankle. The current strength in these trials never exceeded two milliamperes, and generally varied between one and two milliamperes.

Whenever the current was made, the circulation in the foot under the microscope, which was about midway between the two electrodes (three centimetres apart), gradually grew sluggish and finally ceased, complete stasis being produced, the blood vessels dilating. As soon as the current was cut off, gradually movement made itself manifest in the stagnant capillaries, and, becoming more and more lively, the circulation was in a few moments restored to its normal state. The effect was not due to the magnet, however, for it was observed with the current in the coils made or broken. This experiment was gone over frequently by each of us, so that the facts were fully verified.

It was now resolved to put Benedikt's statement to proof that magnetism "increases the resistance to conduction in motor nerves," thus causing paralysis. For this purpose a set of idle field magnets (Fig. 2) which converge into a cylinder two feet in diameter and seven inches deep was employed. In this cylinder a small and lively young dog was placed and kept for five hours, and subjected during all that time to the influence of a magnetic field whose intensity was from 1,000 to 2,000 C. G. S. lines to the square centimetre. Fig. 2 is taken with a boy inside of the cavity in which the dog was kept for five hours. The magnets were excited while the photograph was being taken with the boy in it, as is evidenced by the position of the bolt above, and by the bar of iron A B, which not only supports its own weight in this horizontal position when touching the pole-piece, but also supports the wrench at its outer extremity. The chain, too, is magnetically influenced. There was no effect upon the boy. A clearer idea of the power of this magnet may be obtained when I say that heavy bolts, chisels, and pieces of iron in the immediate neighborhood of this cylinder were drawn to it irresistibly, and that it required considerable muscular exertion to remove them. A heavy bolt placed slightly above the center or axis of the cylinder remained suspended for a moment in the air, like Mohammed's coffin, so powerful were the opposing magnetic forces upon it compared with gravitation.

The five hours' exposure to this influence had not the slightest visible effect upon the animal, which was rather livelier in his capers on being set free than before, owing to his joy at being liberated from the cage.

Our next experiments were directed to studying the influence of magnetic fields on the human brain. The type of dynamo employed for this purpose will be seen in the illustration (Fig. 3). The machine converts about 70 horse-power at full load. The armature and one journal were removed, leaving the space between the pole-pieces free. This will be best understood by reference to the figures. Fig. 4 gives a view of the pole-pieces into the cavity between which the head was to be inserted. This cavity is 35 centimetres (14 inches) in diameter and 60 centimetres deep. The weight of this electro-magnet is over 5,000 pounds, and the intensity of the magnetic field produced within the polar cavity after removal of the armature, though not uniform, may be estimated at a mean of 2,500 C. G. S. lines to the square centimetre. A long board was placed upon the base plate leading into this polar cavity, and the subject experimented upon lay on his back upon the board, with his head and shoulders in the cavity between the poles, and exposed thus to the full influence of the magnetic field. There would be comparatively feeble residual magnetism, with no current in the coils. A switch so nearly silent in action as to be inaudible to the subject was arranged to close and open the exciting current circuit through the field coils. On closing the switch nearly the full magnetic intensity would be active and permeating the head within practically one second (theoretically it takes an indefinitely long time to establish the full current and magnetism). Similarly on opening the switch, almost the whole intensity would disappear in about one second.

Five men, ourselves among the number, were subjected to trial. One case described will describe all.

The subject lay back upon the board and concentrated his attention upon his sensations. His right wrist was extended and was grasped by one observer, who took sphygmographic tracings of the pulse. A second observer placed a hand on his chest to observe any irregularity that might occur in respiration. A third observer, in view of these two, but unseen by the subject of the experiment, opened and closed the switch that excited and relaxed the field, signaling to the first two observers as he did so. The strong magnetic influence was, therefore, turned on or off at will, and without the knowledge of the subject. Several sphygmographic tracings were taken in each of our subjects, and in one the knee-jerk was tested continuously.

The sphygmographic tracings taken continuously during the *séance* show no change in regularity, in spite of the making and breaking of the enormous magnetic influence during its registration. The respirations

*C. G. S., or "centimetre gramme-second," is the unit of measurement employed. The earth's magnetic field, measured horizontally, for instance, is estimated to be 0.18 C. G. S. line to the square centimetre near New York. Consequently our magnetic field was 27,778 times that of the earth's horizontal component, that aligns the compass needle.

were not changed in the least. The knee-jerk also presented absolutely no change. As to common sensations, there were none that could be attributed to the magnetic influence, and the subject could not discover when or whether the field had been excited. The testimony of all five subjects was alike. In one experiment the subject held a steel screw in his mouth, and was then able to tell when the poles were magnetized or demagnetized, but only by the pulling of the screw to one side or another, not by any peculiar sensation or taste.

Our last series of experiments was in connection with reversed magnetism.

A large coil of stout, cotton-covered copper wire, about 30 centimetres high and 25 centimetres internal diameter, composed of nearly 2,000 turns and weighing about 70 kilogrammes, was supported horizontally in such a manner that the head of the subject experimented upon could be freely introduced within the coil, and subjected to the electromagnetic field created there by passing a current through the wire. The resistance of the coil was 10 ohms, and its inductance 0.73 henry. An alternating electromotive force of 1,200 volts, making 140 cycles or 280 alternations to the second, was connected with this coil, the current supplied being 1.85 amperes. The magnetic field in the coil would thus be reversed 280 times to the second. Each of the authors acted as subjects in the experiments, permitting the 1,200 volt alternating current to

FIG. 4.—SHOWING MERELY THE POLE-PIECES OF THE DYNAMO, WITH THE ARMATURE REMOVED. THE HEAD WAS PLACED IN THE CAVITY BETWEEN THEM.

be made and broken frequently in the huge magnetic coil surrounding his head. No effect whatever was experienced. The coil itself hummed with the current, and a strip of sheet iron held in the cavity of the coil, but not touching it, vibrated perceptibly in the hand and gave a distinct, loud sound which was determined to be middle C of the musical scale by means of Helmholtz resonators.

The authors conclude that the human organism is in no wise appreciably affected by the most powerful magnets known to modern science; that neither direct nor reversed magnetism exerts any perceptible influence upon the iron contained in the blood, upon the circulation, upon ciliary or protoplasmic movements, upon sensory or motor nerves, or upon the brain.

While our observations with reversed magnetism indicate that no appreciable influence is exerted upon the brain when subjected to 280 magnetic reversals to the second, we were unable to experimentally alter this frequency, and the possibility remains that some particular frequency or frequencies might affect the nervous system. We hope to decide this question, within a suitable range of frequency, at some future time.

The ordinary magnets used in medicine have a purely suggestive or psychic effect, and would in all probability be quite as useful if made of wood.

While we have demonstrated conclusivly the above facts, we do not deny the possibility of there being invented some day magnets enormously more powerful than any yet known to us, which may produce effects upon the nervous system perceptible to some of the sensory organs; for magnetism is certainly a remarkable force, and we find it very difficult to understand why it seems to have no influence whatever upon the human body and its wonderfully delicate neuro-electric mechanism.

More Edison Lamp Suits.

Two suits were begun on July 27 in the United States Circuit Court for the Southern District of New York by the Edison Electric Illuminating Company, of New York, on the Edison incandescent lamp patent, one being against the Mount Morris Electric Light Company, Edward May and Julius A. May, and the other against the United Electric Light and Power Company, Caleb H. Jackson, Herman H. Westinghouse and George Westinghouse, Jr. Injunctions and accountings of profits are asked for, and the hearing will be had before Judge Lacombe this week.

The new electric railway from Newtonville to Watertown, Mass., will soon be opened.

Volatilization of Metals.

A VALUABLE PAPER BY H. MOISSAN, READ BEFORE THE FRENCH ACADEMY, JUNE 19, 1893.

The readers of the ELECTRICAL REVIEW will remember a short editorial paragraph in our issue of June 24, 1893, calling attention to the results of M. Moissan's experiments concerning the volatilization of refractory metals. After a recital of his experiments, we concluded with the question: "May we not expect that further research in this direction will result in the isolation of more elementary substances?" We now take pleasure to lay before the readers of the REVIEW a complete report of M. Moissan's work, which is a valuable addition to the science of electro-chemistry, and will doubtless lead to the establishment of a new and important branch in this science.

The introduction of M. Moissan's paper is a short recapitulation of his former experiments resulting in the crystallization and reduction of various metallic oxides, the fusion of refractory substances and the distillation of silicon and zirconium.

The present communication, says the author, deals especially with the volatilization of metals and metallic oxides. For this purpose I employ the following method: I take a metallic tube, the inside of which is kept cool by means of a current of water; in fact, I employ the same apparatus as M. H. Sainte Claire Deville used in his classical researches on dissociation.

In this case I prefer to take a U shaped copper tube of 15 millimetres diameter, traversed by a current of water under a pressure of about 10 atmospheres. The bend of the tube is placed within the electrical furnace, about two centimetres above the arc, and directly over the crucible which contains the substance we desire to volatilize. Immediately above the opening through which the tube is introduced, I place a thin mica plate, upon which the vapors condense as they issue from the furnace.

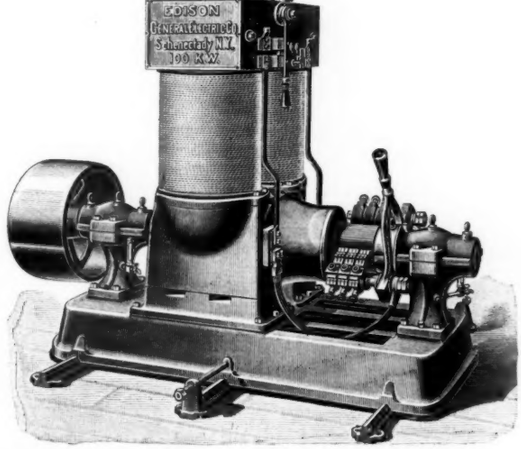

FIG. 3.—TYPE OF DYNAMO USED IN EXPERIMENTS ON THE HUMAN HEAD. THE ARMATURE IS IN PLACE.

By means of this "freezing tube," as I term it, we have succeeded in breaking up or dissociating several so-called stable minerals—for example, the pyrophosphate and silicate of magnesium. The former was subjected for five minutes to the action of a 65 volt 300 ampere current. Shortly after the passage of current abundant vapors issued from the furnace. At the commencement of the experiment the temperature of the water passing through the tube was 15 degrees, 4 degrees C., and in spite of the tremendous heat produced by the arc, the temperature at the close of the experiment had risen but 2 degrees. As a matter of course, the vapors condense quickly upon the outside of the tube, and on examining the latter, I found that it was covered with ordinary phosphorous, which burst into flame at the slightest touch, or slowly oxidized in the air, producing a syrupy layer, which reacted strongly upon nitrate of silver. Besides phosphorous, a careful analysis showed the presence of magnesium. In a second experiment silicate of magnesia, containing some traces of iron, was exposed to the arc in a carbon crucible for six minutes. The current used was 300 amperes under a pressure of 75 volts. At the end of the experiment nothing was found in the crucible except a very small quantity of molten silicate and an iron globule containing 1.6 per cent. of magnesium, and 0.7 per cent. of silicon. But the freezing tube was thickly covered with a greyish powder, showing a great excess of silicon, magnesium and traces of carbon; in fact we did find spheres of transparent silicon which cut glass and gave the well-known characteristic color when tested by spectrum analysis.

These two instances will suffice to show that all such substances which have hitherto been reckoned among the most stable salts may be dissociated into their elements by the action of the voltaic arc.

VOLATILIZATION OF METALS.

Copper.—A piece of copper, weighing 103 grammes, was placed in the carbon crucible and then exposed for five minutes to the action of a 10 volt 350 ampere current. After a minute or so, flames from 0.4 to 0.5 m. length issued from the openings through which the electrodes were introduced into the furnace. These flames were surrounded by thick yellow vapors produced by the oxidation of the metal. At the end of five minutes the current was turned off and the crucible and its contents weighed, showing a loss of 26 grammes of copper by volatilization.

I observed a large amount of copper globules upon the inside of the cover of the crucible, proving the fact that the copper had been distilled. Upon treating the yellow vapor with cold and dilute hydrochloric acid, small copper spheres are deposited, perfectly and easily soluble in nitric acid, while the outer surface of the tube was covered with metallic copper.

Silver.—It has long been known that silver volatilizes at a high temperature. By means of the electric furnace it is very easy to bring silver to the boiling point. If the current is kept on, the silver distills copiously, and is recovered as a gray amorphous dust and arborescent fragments.

Platinum.—This metal is quickly fused and volatilized. It is recovered as small brilliant drops and dust upon the cooler parts of the electrodes.

Aluminum—Using a 70-volt 250 ampere current for six minutes, we obtain a grayish agglomeration of powdered particles upon the freezing tube. By shaking this dust into a glass of water, and then stirring it up, small spheroids of aluminum fall to the bottom. These spheres have a metallic lustre and are attacked by hydrochloric or sulphuric acid, disengaging hydrogen.

Tin.—Duration of experiment eight minutes. Intensity of current 380 amperes, 80 volt pressure. As soon as the current flows, abundant white vapors rise from the electrodes. Oxide of tin, soluble in dilute hydrochloric acid, appears on the freezing tube, and small brilliant globules and a grayish substance constitute a dense layer. Tested with hydrochloric acid, this substance freely disengages hydrogen.

Gold.—Duration of experiment, six minutes; current, 300 amperes, 78 volts. In this experiment 100 grains of gold were placed in the crucible, and at the end of the experiment five grains had been volitalized. Greenish vapors rose abundantly, and the freezing tube was covered with a rich purple powder. Examined under a microscope of moderate power, this powder consisted of small, regular spheres of molten gold of a rich brown color. Again, the powder quickly dissolved in aqua regia, giving all the well-known reactions of salts of gold. An examination of the mica plate revealed the presence of numerous small gold drops and around them appeared a reddish aureola.

Manganese.—This metal, to the volatilization of which M. Jordan has recently drawn attention, produced highly interesting results when heated for 10 minutes by a current of 380 amperes and 80 volts. At the commencement of the experiment 400 grains of manganese had been placed in the crucible. As soon as the current was started the metal gave off heavy vapors, and at the end of 10 minutes nothing but a small metallized carbon button, weighing a few grammes, could be detected.

Iron.—Duration of experiment, seven minutes; current employed, 350 amperes, 70 volts. A grayish powder is deposited upon the freezing tube. This powder has a metallic lustre, appears mammillated, and is quite malleable; in fact, it is very similar in appearance to iron reduced by hydrogen. It can be easily polished by the burnishing process, and dissolves quickly in dilute hydrochloric acid, disengaging hydrogen. Globules of magnetic oxide were noticed upon the mica plate.

Uranium.—Duration of experiment nine minutes; current, 350 amperes, 75 volts. Small metallic spheres were found upon the freezing tube intermingled with a grayish powder, which were easily soluble in acids. Yellowish-brown spheres covered the mica plate. These distilled uranium spheres contain no carbon and are not attracted by the magnet.

METALLOIDS.

Silicium.—This metalloid vaporizes under a current of 380 amperes and 80 volts. Small spheres of molten or fused silicon copiously cover the freezing tube, and these particles are quickly attacked by nitric and fluorhydric acids.

Carbon.—Duration of experiments 12 minutes; current, 370 amperes, 80 volts. By subjecting a crucible filled with carbon fragments to the above-mentioned current, the carbon is changed to graphite and the freezing tube receives a deposit of small, very light, transparent plates of a maroon color. The existence of such carbon has been announced by Berthelot. It remains to state that this substance may be separated from the chalk it contains by diluted hydrochloric acid, leaving a deposit which burns easily in oxygen, producing carbonic acid.

OXIDES.

Chalk.—This substance has been considered as being non-fusible, nevertheless chalk may be volatilized in from eight to ten minutes with a current of 350 amperes and 70 volts. An amorphous powder is found upon the freezing tube, while abundant vapors of calcium oxide issue from the furnace. By using a current of 1,000 amperes and 80 volts, I have volatilized 100 grammes of calcium oxide within five minutes.

Magnesium.—This metal is much more difficult to volatilize than chalk. Its boiling point is also near its point of fusion. The current should be 360 amperes, 80 volts, or better still, 1,000 amperes, 80 volts.

CONCLUSION.

These experiments prove that the metalloids and metals which have hitherto been considered as non-fusible, are easily volatilized by the electric current. Even the most stable compound minerals disappear in the electric furnace, either by dissociation, or volatilization. Only a series of new compounds, in the shape of clearly defined crystals, resist such high temperatures. These are compounds of boron, silicium and carbides of metals.

M. Daubrès has called attention to the fact that carbon in all our organic compound substances was originally combined with metals as a metallic carbide. The electric furnace seems to reproduce the conditions prevailing on the earth at the time when these carbides were being formed. It is not unlikely that these compounds can exist upon stars in a state of extremely elevated temperature. We may add that in those remote times nitrogen could have existed in metallic nitrides, while hydrogen might have freely existed in a gaseous medium of carburreted hydrogen and cyanous compounds.

ITEMS OF INTEREST.

It cost the city of Alameda, Cal., $10,909.50 to maintain its electric light plant during the last fiscal year. Eighty-nine lamps were burning 1,490 hours. This is $1,000 less than the lights have cost in any preceding year for five years.

It is rumored that the Interstate Electric Railroad connecting Attleboro with Pawtucket, Mass., and the Attleboro, North Attleboro and Wrentham Railroad is to pass into the hands of a New Jersey syndicate. The transaction involves some $200,000. This syndicate is the same that bought the Union Railroad, of Providence. It is stated that a large car house will be built at Attleboro, and plans are being made to further extend the electric road from Attleboro through the towns of Norton and Easton to Brockton.

The "Lunken" Gate Valve.

AN IMPROVED DEVICE OF INTEREST TO OPERATORS OF ELECTRIC LIGHT AND POWER PLANTS.

In few industries has there been less genuine invention displayed for many years than in the valve making industry, for the valves of to-day are the same as were used 50 years ago, and about the same defects they had then are still complained of. Why should a valve shell, when once in place, not last as long as the pipe connected thereto? Why should the parts that wear (seat and disk) not be easily renewed? Instead of improving valves and correcting

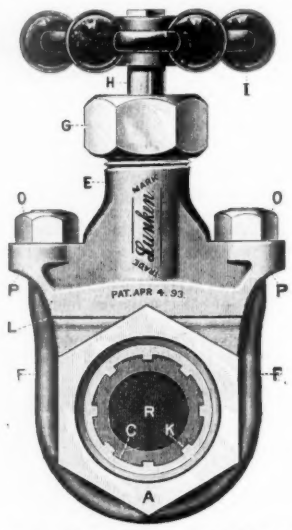

FIG. 1.—THE LUNKEN GATE VALVE.

such faults, manufacturers have done what was possible to cheapen their production, so that the work of replacing a leaky valve (sometimes after but few days' use) costs more than three times the price of the new valve, not considering the annoyances and inconveniences connected with the work. Realizing these facts, the Lunkenheimer Company, of Cincinnati, Ohio, now place upon the market the "Lunken" gate valve. This valve is the result of much study and observation, and it has all the essential features combined that are necessary to make a perfect valve.

Referring to the illustrations, it will be seen that the valve is very unique and neat

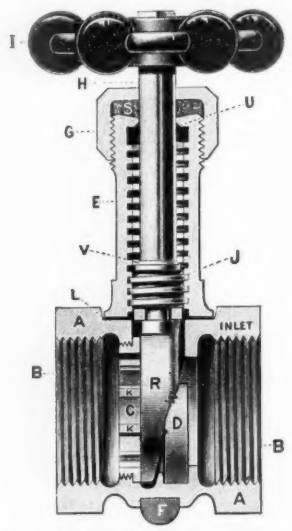

FIG. 2.—SECTIONAL VIEW OF LUNKEN GATE VALVE.

in appearance, and of a construction that indicates great strength. The hub or bonnet is held to the shell by a coppered steel clip or strap surrounding the shell, with its ends passing through the ears of the bonnet, and secured by nuts (O). This clip is held from lateral movement by projections on the shell. The joint is packed by a hard lead washer of 1-64 inch thickness, the top faces of flanges each having a groove, to properly secure the washer. The valve can easily be taken apart without renewing the packing washer. The hub or bonnet is flat and narrow, and just of sufficient size to receive within it the valve disk when entirely raised, and has sectional or part nut threads in its opposite anterior sides. The threaded portion (J) of the stem, by engaging with these part threads, causes the valve to be opened or closed. The disk has a straight flat face or bearing against the renewable seat (C) and is forced tightly against same by the self-adjusting wedging half-ring or horseshoe (D) secured loosely in the valve shell. The wedging on the disk is applied on two wedging surfaces diametrically opposite each other, these coming in contact with the beveled ends of the half-ring or horseshoe wedge; thus the wedging-pressure is properly equalized on the entire disk and insures a tight joint on the opposite face. The pressure of the steam or liquid on the back or wedge side of disk also aids to make a tight closing valve. All valves above 2½ inch size are provided with "By-pass," which arrangement balances the disk before opening same, and thus reduces the friction and wear on seat and disk to a minimum, and makes the valve open easily, regardless of what heavy pressure may be on same. This automatic "by-pass" attachment is an all important improvement. The "by-pass" is shown in Fig. 6, and, briefly explained, is an auxiliary valve formed in the top of the valve disk (immediately below the yoke that secures same to flanged head of the stem (H) and is operated by the stem of valve, automatically, while opening or closing the main valve (C). Channel (N) passing through the disk, connects the inlet or pressure side of the valve with the outlet side, and the end of the stem (H) controls this channel, there being sufficient play in the disk coupling to allow the complete opening of channel (N) caused by the first one-sixth turn of the wheel in opening the valve. The renewable seat is an exteriorly

FIG. 3.—RENEWABLE SEAT FOR LUNKEN GATE VALVE.

threaded flanged ring that screws against a face or shoulder of the flange, the opposite side of which flange forms the seat or bearing surface for the disk to close against. The inner periphery of the renewable seat has lugs or teeth (K) for the engagement of the spanner end (M) of wrench plate (B), by which means, after taking off the bonnet (E), the seat is tightened or loosened through the disk opening of the body without disturbing the pipe connections. In iron body valves the renewable seat (C) screws into a second brass ring, permanently fastened in the iron shell, otherwise, owing to the rusting qualities of iron, the removable seat might rust tight in the shell. The ring end (T) of wrench is used to hold and guide the removable seat into place, so as to properly start its threads into the threads in the shell. Thus, to remove the seat in a valve, it is necessary to proceed as follows: Take off the bonnet (E), loosen the seat with the spanner end (M) of wrench (engaging the lugs on interior periphery of seat, as shown in Plate B). Then unscrew and take out seat. Then place the new seat on the ring end (T) of the wrench, and insert into valve (see Plates C and D), holding the wrench in one hand (to hold and guide the new seat into place), while with the use of a knife or pointed tool in the other hand, the seat (which is knurled or milled on its upper edge) is turned and started into its threads. When properly started and screwed down, the other end of wrench (spanner end M) is applied to tighten the seat firmly. Thus, in a few minutes, and with perfect ease, any person can practically make a worn-out "Lunken" gate valve as good as new, the cost of the renewable seat or a new disk being but trifling. Another important feature is that the stem, when valve is full open, seats itself (V against U), thus relieving all pressure on stuffing-box, and permitting repacking of same under pressure. The tie-band surrounding the shell adds greatly to the strength of the entire valve, and permits of its being taken apart easily with a small wrench. The shell is so short and rigid, and the wedging surfaces are so small, that expansion and contraction do not affect it. Thus the disk will never wedge fast and become inoperative, which is the case with many styles of double seated gate valves. Having but a single disk, and the wedging half-ring taking the place of a second disk, as a wedging resistance, this construction overcomes the objection in double disk gate valves, where liquids remain in the shell between the disks, and often freeze or injure the valve. It is impossible for anything to lodge on the seat of

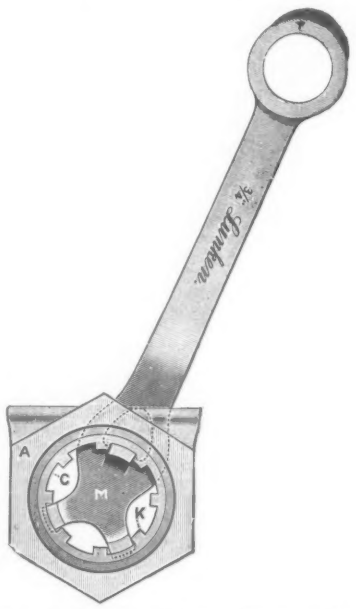

FIG. 4.—SHELL OF VALVE, SHOWING APPLICATION OF SPANNER END (M) OF WRENCH TO SEAT.

this valve, because the disk and seat have a parallel straight face, and as the pressure on the back of disk keeps it tightly pressed against its seat, it actually cuts away (like the action of the blades of a pair of shears) anything in its path. This feature, combined with the renewable seat, commends this valve for blow-off purposes. As regards outside finish, the shape and construction are such that necessitate only the finishing of the stuffing-box, the balance being left a

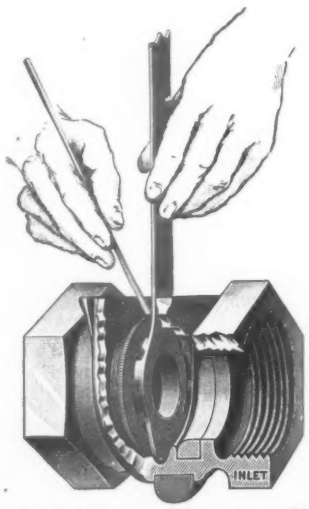

FIG. 5.—GUIDING AND SCREWING A NEW SEAT INTO SHELL.

smooth casting, while the steel band and nuts are drop forged and nicely copper plated to prevent rust.

The "Lunken" gate valve can be used in all places where globe valves, gate valves or stop cocks are used. All parts are interchangeable, workmanship and material first-class, and every valve is warranted to stand a working pressure of 150 pounds to the square inch.

Lockstaedt, of World's Fair Lighting Fame, an Utterer of Forged Paper.

A press dispatch from Chicago, dated July 27, states that by means of false promissory notes, to which the signature of Lemuel Bannister, general manager of the Westinghouse Electric and Manufacturing Company, of Pittsburgh, was forged, Charles C. Lockstaedt, a manufacturing electrician, obtained from various Chicago banks and capitalists sums of money aggregating about $50,000. Lockstaedt has fled, and warrants are out for his arrest on the charge of forgery. Private detectives and the city police are seeking him, thus far without success, and all his assets have been attached by the parties whom he defrauded.

Two years ago C. C. Lockstaedt had a small machine shop at 144 Thirty-first street, Chicago, called the South Side Machine Works. When bids for the incandescent lighting of the World's Fair were opened the directors were surprised to find that, while the General Electric Company's bid was nearly $1,500,000, the South Side Machine Works offered to take the contract for a trifle more than $400,000. Lockstaedt's bid was rejected.

There was trouble, and it came out that the great Westinghouse Company stood ready to guarantee Lockstaedt's bid. The matter was reopened and the contract was let to the Westinghouse Company on the assignment to it by Lockstaedt of his bid.

Lockstaedt prospered, apparently. He organized the Chicago Pulley and Hanger Company, and he had an interest in the Excelsior Boiler Works, and bought a $10,000 house on South Park avenue. He accounted for his means by saying that the Westinghouse Company had paid him $50,000 for his rights as the lowest bidder on the World's Fair contract.

A few months ago Lockstaedt took to the Metropolitan Bank, where he did business, several notes made payable to his order six months after date, and signed by the Westinghouse Company by its general manager, Lemuel Bannister. One of the notes for $5,000 was discounted by the Metropolitan. When due it was sent to Pittsburgh for collection. A few days before it fell due Lockstaedt inquired about it. He was told

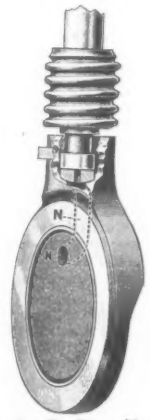

FIG. 6.—BY-PASS VALVE.

that it had been sent to Pittsburgh. He requested that it be recalled, saying that the Westinghouse agency here would pay it. He was told this could not be done. He seemed perturbed, but the note was paid in Pittsburgh by some one, not the Westinghouse Company. It is now thought that Lockstaedt himself sent on the money to meet the obligation, and thus averted exposure.

The success of this venture emboldened Lockstaedt. He next brought to the Metropolitan Bank three notes of the same kind, aggregating $30,000, on which he received an advance of $28,000. From the Chicago Trust and Savings Bank he got $15,000 on two notes; from Wasmensdorf & Heinemann $7,000 on a $15,000 note, and with the Avenue Savings Bank he pledged a note of $5,000. His loans from Wasmensdorff & Heinemann and the Avenue Bank he repaid in part. Other people are known to have been caught. A man who declined to give his name showed Cashier Preston, of the Metropolitan, a Westinghouse note for $10,000 which he had received from Lockstaedt. The total amount of forged paper uttered by Lockstaedt is $88,000. The exposure came on Saturday, when its Pittsburgh correspondent informed the Metropolitan Bank that a note sent to it for collection had been pronounced a forgery.

ADVANCE INFORMATION.

New Electric Companies Formed and Important Constructions Projected.

VALUABLE INFORMATION FOR MANUFACTURERS AND DEALERS.

We publish below the earliest information obtainable relating to new electric railways, new electric light companies and projected electric construction of all kinds. Every reader will find these columns of special interest, and manufacturers and supply houses will receive many valuable suggestions looking to new business by carefully watching this department in the ELECTRICAL REVIEW from week to week.

New Electric Railways.

NEW YORK CITY.—The National Street Railway Construction Company, to construct and equip railroads, has been incorporated with a capital of $5,000. The directors are Edward S. Perot, of Yonkers; Cornelius Gallagher, Ellison Crawford and Thos. F. O'Connor, of New York city; and James P. McQuaide, of Plainfield, N. J.

OAKLAND, CAL.—The East Oakland Street Railway Company is an applicant for a franchise to build an electric railway to Oakland.

STONEHAM, MASS.—The Mystic Valley Street Railway Company has petitioned the selectmen for a street railway franchise.

BALTIMORE, MD.—The Baltimore, Middle River and Sparrow's Point Railroad Company; capital, $400,000. Incorporators, Thomas B. Gatch, L. S. Morris, Frank W. Temble, John J. Forester and James Sloan Hoskins. The company is organized for the purpose of building an electric line from Baltimore to Sparrow's Point.

WASHINGTON, D. C.—Efforts are being made to sell the Washington and Arlington Electric Railway. No price has been officially placed upon it.

DUBUQUE, IOWA.—The Dubuque Electric Light and Traction Company has been incorporated by James S. Cummins, W. J. Ballard, E. W. Duncan, Geo. K. Wheeler and John L Martin. Capital, $600,000.

PATERSON, N. J.—The State Subway Commission has granted the Grand Street Electric Railway Company permission to erect poles and to string wires for a trolley system.

LANCASTER, PA.—The Pennsylvania Traction Company; capital, $10,000. Incorporators, John J. Patterson, S. M. Patterson, of Mifflintown; J. H. Brown and John D. Skills, of Lancaster. This is the company organized to control and operate all the street railways in Lancaster and its suburbs.

LOCKPORT, N. Y.—Local capitalists have subscribed almost $12,000 for the construction of an electric railroad from Lockport to Buffalo. William Bell, of the Sanborn road, and Dr. Lapp, of Clarence, are canvassing for stock subscriptions.

FREDERICK, MD.—The contract for the construction of the Frederick and Middletown Valley Electric Railway has been awarded to the Hughes & Rigby Engineering Company, of Baltimore. There were about 15 proposals, ranging from $85,000 to $115,000.

PROVIDENCE, R. I.—The town council of Coventry, R. I., has given the Union Railroad Company the right to lay rails, erect poles and operate cars by electricity in Coventry, for a period of 25 years.

EAST ST. LOUIS, ILL.—The East St. Louis Street Railroad Company has increased its capital stock to $500,000 and issued bonds, the proceeds to be used to complete the double track extension on Broadway.

WALNUT GROVE, CAL.—John Miller is organizing a company to build an electric railway from Sacramento to Walnut Grove; 30 miles.

Electric Light and Power.

REDFIELD, S. D.—J. L. W. Zietlow, of Aberdeen, has perfected arrangements for establishing a large electric plant in Redfield.

SANTA MONICA, CAL.—The Santa Monica Electric and Power Company; capital, $40,000. Incorporators, H. V. Carter, of Los Angeles; A. Steadman, of Monrovia; F. W. Carter, J. J. Davis and H. A. Winslow, of Santa Monica.

TILBURY, ONT.—An electric light plant will be established here by the Reliance Company.

COLUMBUS, OHIO.—The Columbus Edison Electric Light Company has increased its capital from $200,000 to $258,000.

DANVILLE, KY.—A syndicate composed of English and American capitalists has purchased Cumberland Falls, and will utilize them to furnish power for an immense electric plant. It is the purpose of the syndicate to generate electricity, to be furnished for lighting towns and for the use of manufactories. It is also proposed to construct an electric freight and passenger line from the Falls.

GRIFFIN, GA.—The Thomson-Houston Company will build a new incandescent electric light plant in this city.

BROCKPORT, N. Y.—The Brockport Electric Light Company has leased a water power at Clarkson and will utilize it for the generation of electricity.

MILWAUKEE, WIS.—The members of the Wisconsin Electric Light and Power Company have decided to build a plant for the manufacture of dynamos.

SEATTLE, WASH.—The Nordlund Arc Lamp Company; capital, $15,000. Incorporators, Robert J. Wilson, L. B. N. Nordlund, Charles A. White and C. M. Nordlund. The company will manufacture and sell arc lamps and electrical appliances of all kinds.

ELMIRA, N. Y.—A contract has been closed with the General Electric Supply Company by the West Side Electric Railway Company for two large 235 horsepower generators and slate panel switch boards for the company's new stations.

New Manufacturing Companies.

NEW YORK CITY.—The Duplex Trolley Company, to manufacture electric machinery and appliances; capital, $10,000; directors, C. E. Chinnock and Jos. Bruns, of Brooklyn; D. E. Rose and L. Beyer, of New York city.

FOSTORIA, O.—The Crouse-Tremain Carbon Company has been incorporated by J. D. Crouse, H. A. Tremain and Ira Cadwalader.

MECHANICSTOWN, MD.—The American Signal Company has been organized to manufacture the automatic and electromagnetic crossing signal, of which Richard O'Toole, of Mechanicstown, is the inventor.

MILWAUKEE, WIS.—The Gibbs Electric Company; capital, $2,000. Incorporators, George Gibbs, Lucius T. Gibbs and J. W. Sutterlee. The company will manufacture and deal in railway and electric light supplies.

NEW YORK CITY.—The Miller Electric Company; capital, $5,000. Incorporators, Sylvanus E. Miller, of Brooklyn, and Charles H. Coffin, of New Rochelle. The company is organized to manufacture electrical supplies.

CAMDEN, N. J.—The Technic Electric Works; capital, $20,000. Incorporators, David Pepper, Jr., Albert L. Register and others.

WILLAMETTE FALLS, ORE.—The Willamette Falls Company; capital, $100,000. Incorporators, P. F. Morey, Charles H. Canfield and others.

ATLANTA, GA.—The Gate City Electric Supply and Construction Company; capital, $8,000, with privilege to increase to $25,000. Incorporators, James B. Hollis, T. L. Hardin and James W. Austin.

CHICAGO, ILL.—The Electric Burglar Alarm Company; capital, $250,000. Incorporators, Jacob Lindheimer, George D. Hoffman, Jacob S. Hoffman.

New Telephone and Telegraph Companies.

SCHOHARIE, N. Y.—The Schoharie Telegraph Company, to construct a line between Schoharie and Central Bridge; capital, $500; directors. D. S. Mayham, Phillip Dey, George L. Taylor, and others, of Schoharie.

SAN FRANCISCO, CAL.—The Sunset Telephone and Telegraph Company has borrowed $750,000 on an issue of bonds, the proceeds of which will be used for extensive improvements to be made to the system throughout the coast.

CHESTERTOWN, N. Y.—The Chestertown Telephone Company; capital, $2,000. Incorporators, Stanley H. Bevins, Frederick Vetter, Winnifred W. Bevins, Charles H. Burge and others. The lines will run through Warren, Essex and Hamilton Counties.

ALEXANDRIA, VA.—The Kesmit Telephone Company; capital, $25,000. G. F. Cooke, of Washington, D. C., is president, and J. S. Beach is local agent. The company is organized to manufacture and sell telephone apparatus and supplies.

MADISON, WIS.—The preliminary work has been done toward organizing a rival to the Wisconsin Telephone Company, of this city. The scheme is to put in a plant to cost $50,000, to be owned by stockholders, who must be subscribers to the Telephone Exchange.

Transportation to the International Electrical Congress.

Mr. C. O. Baker, Jr., master of transportation of the National Electric Light Association, has been appointed to fill a similar office for the Advisory Council of the International Electrical Congress, which meets at Chicago on August 21. In view of the large number of delegates from the East and the constant demands for information as to railroad facilities, Dr. Elisha Gray, president of the Advisory Council, has placed the matter of transportation solely in Mr. Baker's hands. That the right man is in the right place is attested by Mr. Baker's previous successes in this line. His headquarters will be at the office of the National Electric Light Association, 136 Liberty street, New York city, where Secretary Porter has placed all the facilities at his disposal. Mr. Baker is now preparing a circular of information for the special benefit of Eastern members of the Congress and their friends. In all probability a large Congress special will be run.

It is necessary, in order to provide the best traveling facilities, that Mr. Baker be informed at the earliest possible moment of the number and names of delegates intending to go to the Congress.

The Congress Committee on Invitations has accomplished the heaviest part of its work, although it expects to be busy up to the very opening of the Congress. It has issued nearly 950 individual invitations, of which about 600 are American and Canadian, including some of the foreign electricians attached to the World's Fair. It has also issued general invitations to 12 foreign electrical and scientific societies, with a membership of perhaps 3,000 or 4,000, but of these a very small proportion may be looked for. It is believed that the Congress will muster, however, not less than 500 strong, or even more. All the individual invitations have been canvassed by the Committee on Invitations and by President Gray, and it is safe to say that a more representative list of scientific and professional men, as well as those of large practical interests, was never before gotten together, so far as America and Canada are concerned. The foreign element of the Congress will be large, all told, and more distinguished, even, for reputation and influence than for its numbers. The programme of papers and topics for the two Chambers is in preparation, and will be issued shortly before the Congress convenes. Everything points to a most brilliant and successful Congress at Chicago.

ELECTRICAL PATENTS

INDEX OF INVENTIONS FOR WHICH LETTERS PATENTS OF THE UNITED STATES WERE ISSUED ON JULY 4, 1893.

500,545 Telephone system; George L. Anders, London, England, assignor of three fourths to Walter Kottgen, same place.

500,563 Signaling system; William E. Decrow, Boston, Mass., assignor to the Gamewell Fire Alarm and Telegraph Co., of New York, N. Y.

500,579 Power transmission; Albert L. Ide, Springfield, Ill.

500,601 Safety cut out; Olof Offrell, Middletown, Conn., assignor to the Schuyler Electric Co., of Connecticut.

500,605 Magnetic ore separator. 500,606 Device for and method of adjusting and equalizing the magnetic density in the pole pieces of magnetic separators; Clarence Q. Payne, Stamford, Conn.

500,614 Brush holder for dynamo-electric machines; Henry G. Reist, Lynn, Mass., assignor to the General Electric Co., of New York, N. Y.

500,622 Secondary battery; William L. Silvey, Lima, O.

500,629 Electric switch. 500,630 Method of and means for producing alternating currents. 500,631 Rheostat; Elihu Thomson, assignor to the Thomson-Houston Electric Co. of Connecticut.

500,644 Electric ignitor; William F. West, New York, N. Y., assignor to Clement Gould, same place.

500,657 Electric arc lamp; Rudolph M. Hunter, Philadelphia, Pa., assignor to the Thomson-Houston Co. of Connecticut.

500,663 Electric motor; John MacHaffie, Schenectady, N. Y.

500,668 Railway signal apparatus; Joseph C. G. Mugnier, Paris, France.

500,670 Incandescent electric lamp; William E. Nickerson, Cambridge, and Edward E. Pary, Boston, Mass.

500,671 Incandescent electric lamp; William E. Nickerson, Cambridge, Mass.

500,681 Electric soldering iron and heater; August Tinnerholm, Schenectady, N. Y.

500,685 Braiding machine; Adolph Bayler, New York, N. Y., assignor to Louis Raffloer, same place, and Charles H. Schott, Brooklyn, N. Y.

500,726 Lightning arrester; Charles S. Van Nuis, New Brunswick, N. J.

500,767 Electro medical appliance; Sophia Hetherington Carruthers, Sydney, New South Wales.

500,775 Apparatus for recording the flexure of bridges; Emile Parenthon, Paris, France.

500,776 Corn operated induction coil; William R. Pope, Baltimore, Md., assignor to the National Electric Machine Co., New York, N. Y.

500,822 Electric hose coupling; Joseph B. Strauss, Cincinnati, O., assignor of one-half to Moe C. Weil, same place.

500,827 Railway signal system; Geo. L. Thomas, Brooklyn, N. Y., and Edward C. Seward, Montclair, N. J., assignor to said Thomas.

500,828 Lightning arrester. 500,829 Electric arc lamp; William A. Turbayne, Detroit, Mich.

500,841 Incandescent lamp globe; Thomas B. Atterbury, Pittsburgh, Pa.

500,849 Electric incandescent lamp; Henry D. Burnett, Lynn, and Samuel E. Doane, Swampscott, Mass., assignor to the General Electric Co., of New York, N. Y.

500,851 Electric locomotive; Lawrence W. Case, Highland Park, Conn.

500,868 Multiphase meter. 501,000 Meter for alternating, pulsating or intermittent electric currents; Thomas Duncan, Fort Wayne, Ind.

500,902 Ring armature; Charles N. Jefferson, Schenectady, assignor to Eugene Munsell & Co., New York, N. Y.

500,918 Electric switch; George E. Linton, Worcester, Mass.

500,937 Conduit railway insulator; George E. Noyes, Washington Grove, Md.

500,943 Electric railway system; Frederick S. Perrin, Lynn, Mass.

500,957 Ear piece; Rudolph Seifert, Chicago, Ill.

500,973 Electric welding machine; Maximilian M. Suppes, Johnstown, Pa.

580,978 Secondary electric battery; Chas. Theryo and Alfred Oblasser, Paris, France.

501,009 Overhead electric railway; John C. Henry, Westfield, N. J.

501,021 Insulating compound; Louis McCarthy, Boston, Mass.

ELECTRIC LIGHT FLASHES.

An electric light plant will soon be erected in St. Martinville, La.

Rockford, Mich., will be lighted by electricity in about a month.

Stoughton, Mass., has voted to purchase the electric lighting plant in that place.

The Fernandina, Fla., Light and Power Company contemplate improving their plant.

A new rocket torpedo, actuated by electricity, is being tested at the torpedo station at Newport.

The price of electric lights at Batavia, N. Y., has been raised to $115 per lamp. This is a raise of $15.

It is estimated that the plant capacity of all the central electric lighting stations of London reaches an aggregate of 850,000 eight candle-power lamps.

KINDRED INTERESTS

The Stirling Company, through Fred. A. Scheffler, general sales agent, 74 Cortlandt street, New York, last week made the following sales of water tube boilers, which, considering the financial depression, make a pretty good showing: Minneapolis Electric Company, Minneapolis, Minn., 750 horse-power; J. G. Mattingly Company, Louisville, Ky. (second order), 750 horse-power; Taylor Chair Company, Bedford, Ohio, 150 horse-power.

E. G. Bruckman, manager of the Electrical Engineering Company, Equitable Building, St. Louis, Mo., has been awarded the contract for the installation of the electric light work of the new Union Depot, at St. Louis, being one of the largest of its kind in the world, 600 by 700 feet. Mr. Bruckman has also been awarded the contract for 6,000 incandescent lights in the Union Trust Company's fourteen story building, now in the course of construction at St. Louis.

The Scranton and Carbondale Traction Company.

This road should not be confounded with the present electric road in Scranton, Pa., or the little road in Carbondale, 17 miles north of Scranton. This road is the connecting link between the two cities. It acquired the right of way of the Blakely and Dickson Traction Street Railway Company, which extends along the old Providence and Carbondale turnpike from Scranton, north, to the town of Archbald, and connects all the towns and villages north of Scranton in the Lackawanna valley.

The contract for the entire roadbed and track construction was given to the Johnson Company, of Johnstown, but work was delayed, owing to heavy frosts and mud, until the last of May. It was practically the first of June before track laying was fairly under way. J. G. White & Company, of New York city, have the contract for the overhead line work, etc. There will be 16 Brill cars, eight open and eight closed vestibule cars, which will be equipped with the General Electric Company's latest type of 25 horse-power motors. The Berlin Iron Bridge Company, of East Berlin, Conn., have the contract for the fire-proof buildings, and the entire road will be first-class in every respect. The road is laid with 56-pound "T" rail throughout, on extra heavy ties placed two feet between centers.

The entire construction is under the supervision of Mr. A. H. Chadbourne, who temporarily moved up to Scranton to give this his personal attention.

The road will be opened early in August, and will be the most important link in the railway systems of the Lackawanna valley, as it gives direct communication to a large outstanding population into the heart of Scranton. This population is now indifferently served by steam roads, whose energies are devoted to the carrying of coal rather than to passengers.

Mr. George A. Fletcher, a wealthy merchant, of Philadelphia, is the president, and Mr. Alfred N. Chandler, of Louchheim & Company, bankers, of Philadelphia, has charge of the finances of the company.

The Lackawanna Trust and Safe Deposit Company, of Scranton, are the trustees under the mortgage.

ELECTRIC LIGHT.

The Municipal Council invite tenders up to the 30th of December next for Lighting the City of Launceston, Tasmania, by Electricity.

Plans, etc., can be seen at the office of the Agent General for Tasmania, 5 Victoria St., London, S.W.

The lowest or any Tender not necessarily accepted.

C. W. ROCHER,
TOWN CLERK.

Town Clerk's Office,
Launceston, 20th May, 1893.

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New Electrical Books.

THE DYNAMO, ITS THEORY, DESIGN AND MANUFACTURE.—190 illustrations. By C. C. Hawkins and F. Wallis. $3.00.

In writing the present book it has been the endeavor of the authors to furnish to students a simple, yet accurate, account of the theory and design of the modern dynamo.

Further, their subject has been "the dynamo," and to this they have closely confined themselves, thinking it better to deal as strictly as possible with the dynamo, pure and simple, than to fill the pages with haphazard items of knowledge about motors, or central stations, or systems of electric distribution.

MARINE ELECTRIC LIGHTING.—Electricity in Ships-of-War, Vessels of the Mercantile Marine, Yachts, Lighthouses, Harbors and Docks. Numerous illustrations and plates. $2 00.

PORTATIVE ELECTRICITY: Being a Treatise on the Application, Methods of Construction and Management of Portable Secondary Batteries. By J. T. Niblett. Fully illustrated. $1.00.

The aim of this little book is to point out some of the numerous purposes to which portative electricity is lending itself, to explain the methods employed in the construction of such appliances, and also to give direction as to their intelligent management.

THE ELECTRIC TRANSMISSION OF INTELLIGENCE. And Other Advanced Primers of Electricity. By Prof. E. J. Houston. 88 illustrations. $1.00.

PRACTICAL DYNAMO BUILDING.—With Detail Drawings and Instructions for Winding. Giving correct sizes of Wire, Dimensions of Iron, etc., etc., also Diagram for House Wiring. By L. C. Atwood. Illustration and Plates. $3.00.

NOTES ON RECENT RESEARCHES IN ELECTRICITY AND MAGNETISM.—Intended as a Sequel to Professor Clerk-Maxwell's Treatise on Electricity and Magnetism. By J. J. Thomson. $4.50.

HOW TO USE ELECTRICAL MEASUREMENT APPARATUS.—A Manual of Practical Information Relating to Electrical Testing. Price, 50 cents.

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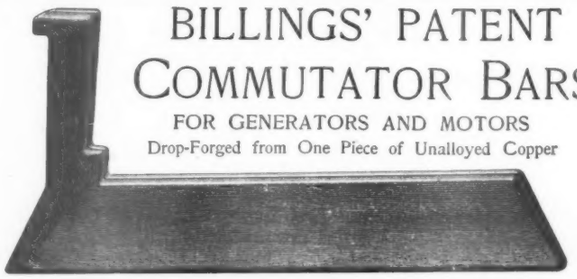

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